

**BCOE-143**

# **FUNDAMENTALS OF FINANCIAL MANAGEMENT**



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‘शिक्षा मानव को बन्धनों से मुक्त करती है और आज के युग में तो यह लोकतन्त्र की भावना का आधार भी है। जन्म तथा अन्य कारणों से उत्पन्न जाति एवं वर्गगत विषमताओं को दूर करते हुए मनुष्य को इन सबसे ऊपर उठाती है।’

— इन्दिरा गाँधी

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*“Education is a liberating force, and in our age it is also a democratising force, cutting across the barriers of caste and class, smoothing out inequalities imposed by birth and other circumstances.”*

— Indira Gandhi

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March, 2022

© Indira Gandhi National Open University, 2022

ISBN : 978-93-5568-352-6

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*Further information on the Indira Gandhi National Open University courses may be obtained from the University's office at MaidanGarhi, New Delhi-110 068.*

Printed and published on behalf of the Indira Gandhi National Open University, New Delhi, by the Registrar, MPDD, IGNOU.

Laser typeset by Tessa Media & Computers, C-206, A.F.E-II, Jamia Nagar, New Delhi-110025

Printed at : Raj Printers, A-9, Sector B-2, Tronica City, Loni (Gzb.)



**BLOCK 1**  
**INTRODUCTION TO**  
**FINANCIAL MANAGEMENT**

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## BLOCK 1 INTRODUCTION TO FINANCIAL MANAGEMENT

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Finance is the most crucial and essential part of each and everyone's life therefore managing finances becomes all the more important. Looking at present uncertain and complex scenario it is very important for the organizations to manage their resources optimally. When we talk about Financial Management it implies the planning, organizing, directing and controlling of all the financial activities like procuring the funds and utilizing those funds optimally. The focus of financial management is on ratios, equities and the debts. The interrelationship between the three defines the concept of financial management. To be precise it is the effective and efficient management of funds which helps the organization achieve its goals. Technically financial management is associated with the top management and the decisions taken at the top percolates down to the bottom for implementation.

This block focuses on the concept and functions of various aspects of financial Management. This is the first block of this course and has 4 units. Each unit discusses different concepts of finance which will form the foundation of the whole course.

**Unit 1 - Financial Management: An overview:** This unit discusses the concept of finance and why it is important for decision making in the organization. It further explains the evolution, nature, objectives of financial management and the role of financial manager.

**Unit 2 - Time value of Money:** Time value of money in financial management is an important concept as it represents the relationship between future value and present value of money. In this unit, the concept of interest and its types, future values, present values, sinking fund and perpetuity have been discussed and also how to calculate the future value and present value of money to understand the concept thoroughly.

**Unit 3 - Sources of Finance:** This is the third unit of the block, it the classification of sources of finance based on time, ownership and control and sources of generation. The major focus of this unit is to make you differentiate between long terms sources with that of short term sources of finance.

**Unit 4 - Risk and Return:** This is the last unit of the block and discusses the concept of risk and return, types of risk, various techniques to measure the risk and risk-return trade off.

In all, this block will make you familiar with the basic concepts of financial management and will lay a foundation for understanding other concepts in further blocks.

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# **UNIT 1 FINANCIAL MANAGEMENT: AN OVERVIEW**

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## **Structure**

- 1.0 Objectives
- 1.1 Introduction
- 1.2 Evolution of Financial Management
- 1.3 Nature of Financial Management
- 1.4 Finance and other related Disciplines
- 1.5 Objectives of Financial Management
- 1.6 Risk and Return trade-off
- 1.7 Role of Finance Manager
- 1.8 Let Us Sum Up
- 1.9 Key Words
- 1.10 Self-Assessment Questions

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## **1.0 OBJECTIVES**

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After studying this unit, you should be able to:

- comprehend the evolution of financial management;
- understand the nature and scope of financial management;
- discuss the relationship of finance with other disciplines;
- understand the objectives of financial management;
- assess the functions of finance manager; and
- explain the concept of risk and return trade off.

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## **1.1 INTRODUCTION**

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The main objective of any business organization is to generate profits, be it a manufacturing organization or a service organization. Any business or for that matter any activity requires financial resources at any point of time. Financial resources for any organization needs to be planned, directed, monitored, organized and controlled for its optimum utilization. This is where the role of finance manager comes into picture. Now the question arises as to what is financial management? If we have to explain it we can break it into 'Finance' and 'Management'. When we combine these two words it becomes financial management.

Finance + Management = Financial Management.

We can say that when the financial resources are combined with the management functions, it becomes financial management. In this unit we are going to learn the evolution of financial management, its nature and scope, objectives, risk-return trade off and role of a finance manager.

## 1.2 EVOLUTION OF FINANCIAL MANAGEMENT

Before we discuss the evolution of financial management, it is important to understand the difference between money and finance.

### What is Money?

It is a physical form which is in terms of a nation's currency. But with the digitization of money, digital currency has also been introduced and such money is not in a physical form. However, we will consider money in its conventional form. Money is used to buy something be it by an individual or by an organization or by a nation. It can be used to buy:

- assets
- groceries
- clothes
- other items

### Difference between Money and Finance

Let us now understand the basic difference between Money and Finance. Suppose you have ₹10,000 you spend on your daily needs like groceries, vegetables, clothes etc. In this case you call it Money. Now, you also have ₹10,000 as savings and you want it to invest it say in term deposit. In this case it becomes Finance. We can therefore say that when currency is in hand and is spent without giving returns it is known as 'Money' and when it is invested in some kind of assets with the expectation that there will be some return associated with it then it is known as 'Finance'.

Therefore, the whole concept of finance is management of money with proper decision-making. This management of finances is known as Financial Management.

Let us now see how financial management evolved as a discipline. In the early 1990's financial management emerged as a distinct field and became a separate discipline from accounting. The need for separate discipline was felt due to the complex situations arising out of fast industrialization and increase in competitiveness. To understand the evolution of financial management, it can be divided into three phases. These are:

1. Traditional Phase
2. Transitional Phase
3. Modern Phase

1. **Traditional Phase (1900-1940) :** In earlier times finance basically meant of trying to procure funds through different ways and means. The funds were procured through different sources of financing (this we will learn in Unit 3) like loans, shares, debentures etc. It basically involved estimating the needs of the organization and accordingly arranging for the funds. The focus was more on long term sources and to the accounting aspects. This phase lasted for about four decades. Over the years this concept has taken a backseat as it does not involve the decision making process. The concept of financial management evolved over the years and led to the transitional phase.
2. **Transitional Phase (1940-1950) :** It was similar to the traditional phase. In this phase the importance was given to day to day problems and focus was on the planning, analyzing and controlling part. Slowly the emphasis on the decision-making started during this phase. This led to the evolution of modern phase.
3. **Modern Phase (1960 to present) :** This phase is an extension of traditional phase where the procured funds are put to optimum utilization. This phase focuses more on shareholders' wealth maximization. This approach is more logical and rational as it involves decision making on part of the financial manager.

These three phases have led to the advent of two approaches which are:

Traditional Approach

Modern Approach

Traditional approach focuses on procurement of funds only whereas modern approach focuses on procurement of funds along with its optimum utilization.

### **1.3 NATURE OF FINANCIAL MANAGEMENT**

Finance is the lifeline of any business organization. The procurement of funds and its efficient use is very important for any organization. Any organization has to decide why, what, where, how and when of finances. It should focus on:

- Why the funds are required?
- What sources can be used to procure funds?
- Where from the funds will be procured?
- How will the funds be distributed for optimum utilization?
- When should the organization plan for getting more funds?

The finance functions involve the answers to the above questions. Therefore, we can say that the key elements of financial management are:

1. Planning
2. Allocation of resources
3. Managing the resources

#### 4. Control

It has been defined by different writers as follows:

- As per Ezra Soloman — “Financial Management is concerned with efficient use of an important economic resource namely capital funds. It is the study of the problems involved in the use and acquisition of funds”
- According to Weston and Brigham – “Financial Management is an area of financial decision making, harmonizing individual motives and enterprise goals”.
- Phillipatun has given a more amplified meaning of financial management. According to him, “Financial Management is concerned with managerial decisions that result in the acquisition and financing of short and long-term credits for the organizations”.

Financial Management therefore can be defined as a management decision that results in the procurement of funds with its optimum utilization. The nature of financial management involves the following functions:

1. Investment Decision
2. Financing Decision
3. Dividend Decision

**Investment Decision:** This function of the financial management involves appropriate selection of assets where the investment will be done. This can be done under two broad heads:

- Long-term assets
- Short-term or Current assets

Long term assets yield return over a period of time in future whereas short term assets are usually converted into cash within a year. Therefore, we can say that

- investment in long-term assets is known as capital budgeting
- management of short-term assets is known as working capital management

Both these concepts you will be studying in further units.

**Financing Decision:** The investment decision is considered with proper asset mix whereas financing decision deals with identification of sources of finance determining the financing mix. Determining financing mix is also known as capital structure. It refers to the proportion of debt while procuring funds. There should be a balance between owners' funds and outsiders' funds and long-term funds and short-term funds. The firm has to make use of the external and internal funds and employment of these resources in various combinations is called leverage analysis. Financing decision involves the following two aspects:

- capital structure theory
- capital structure decision

**Dividend Decision:** The third function of financial management is related to the dividend policy. In this case the dividend is to be analyzed related to the financing decisions of the firm. There are two options available with the firm:

- to retain the profits
- to distribute the profits in form of dividend to the shareholders

The appropriate decision is to be taken by the firm keeping in mind the following aspects:

- dividend payout ratio
- preference of shareholders
- investment opportunities to the firm

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## 1.4 FINANCE AND OTHER RELATED DISCIPLINES

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Finance can be divided into two broad categories. These are:

- Public Finance
- Private Finance

**Public Finance** deals with the matters related to the government. It can be Central or State government or governmental institutions. This deals within the funds which are raised through taxes etc. The main objective of public finance is to deal with social or economic objectives than trying to earn profits.

**Private Finance** on the other hand involves personal finance, business finance or finances of the bodies other than governmental institutions.

Let us now discuss financial management in relation to other disciplines. There are basically two disciplines viz Economics and Accounting which are closely related to financial management. In fact it can be said that financial management actually emerged from these two disciplines.

### Financial Management and Economics:

Economics can be divided into macroeconomics and microeconomics. Macroeconomics is the broader concept and deals with the overall environment of the nation or the globe where an industry operates. There are external factors like economy of the nation, government policies etc. which are beyond the control of any organization. When we relate macroeconomics with financial management, the banking system, capital markets, financial intermediaries, RBI, monetary, fiscal and economic policies etc. come into the picture.

On the other hand microeconomics is the organizations' internal environment which is controllable in nature. This includes the nature and size of the

organization, liquidity position, pattern and ownership of the organization etc.

These aspects when studied in detail show that how Financial Management is closely related to economics.

### **Financial Management and Accounting:**

As discussed earlier the traditional approach of financial management basically targets the accounting aspect of the firm. With the evolution of financial management, the other aspects like decision making came into picture. It is said where the accounting ends, financial management begins. This clearly shows the close association of financial management and accounting. Let us take an example to understand this. We know that accounting deals with data collection and reporting whereas finance deals with reading these data, analyzing it and finally making a decision.

Example: A firm 'X' has the following transactions in a year:

Sales	-	₹ 10,00,000
Cost of Sales	-	₹ 7,00,000
Opening & Closing Stock	-	Nil
Collection from Sales	-	₹ 2,00,000
Payments to Suppliers	-	₹ 6,00,000

Let us now see the accounting view and financial view of the same.

<b>Accounting View (Profit &amp; Loss Account)</b>  (Amount in ₹)	<b>Financial View (Cash Flow Statement)</b>  (Amount in ₹)
Sales - 10,00,000	Cash inflows - 2,00,000
Less Costs - 7,00,000	Less: cash outflow - 6,00,000
Net Profit - 3,00,000	*Net cash outflow - 4,00,000
(*here net cash outflow is more than the inflow i.e. negative)	

This is how the relationship between the two is seen.

### **Check Your Progress A**

- 1) List the phases in evolution of financial management.
- 2) What are the different kinds of finance functions?
- 3) How is Financial Management related to:
  - i) Economics
  - ii) Accounting

## 1.5 OBJECTIVES OF FINANCIAL MANAGEMENT

The objectives of financial management provide a framework for making optimum decisions. There are two objectives of financial management which are as follows:

- i) Profit Maximization
- ii) Wealth Maximization

The objectives are means to reach to a goal of a business. Let us discuss these.

**Profit Maximization:** In general terms it means maximizing the income of the firm. When we discuss this concept it is quite vague as it does not clearly spell out the following:

- a) What are the profits?
- b) What is the absolute value of earnings per share?
- c) Does the profits have return on investment?
- d) Are the profits calculated before tax or after tax?

Initially this objective was the main aim of the firm and there are many arguments in favour of this. In case a firm adopts the concept of profit maximization then the returns are achieved at a later stage which may not be good for the financial health of the firm. In present times profit maximization is also not socially responsible decision on part of the firm. Let us see some pros and cons of this approach.

PROS	CONS
<ul style="list-style-type: none"> <li>• Resources utilized efficiently</li> <li>• Measure of firms' performance</li> <li>• Serves the interest of the society</li> <li>• Test of economic efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Vague and ambiguous</li> <li>• Ignores time pattern of profits</li> <li>• Ignores risk and time value of money</li> <li>• Ignores quality aspect of benefits</li> <li>• Unrealistic</li> <li>• Ignores socially responsible behaviour</li> </ul>

In profit maximization 'the bigger the better' concept is adopted. Let us understand this through table 1.1 and 1.2 respectively.

**Table 1.1 : Time-Pattern of Profits**

Time Period	Option A (₹ in lakh)	Option B (₹ in lakh)
I	100	--
II	200	200
III	100	200
<b>Total</b>	<b>400</b>	<b>400</b>

As visible in table 1.1 total profits associated with option A and B are the same. If the firm considers profit maximization criteria, then both options are equally good as at the end of the day both earn same amount of profits. But as you can see the two options are not the same as the earnings vary during different time periods. This shows that the time pattern of the benefits received from certain investment is ignored. Let us now see another case.

**Table 1.2 : Uncertainty about expected profits**

**Profit (₹ in Lakh)**

Economic view (Time Period)	Option A	Option B
Recession	10	--
Normal	15	20
Boom	20	25
<b>Total</b>	<b>45</b>	<b>45</b>

As you can see in the table 1.2 the total returns are again identical but the outlook of profit maximization is quite narrow as it ignores the risk factor or uncertainty associated with either of the options. It also ignores time value of money.

The alternate to this concept is Wealth Maximization.

**Wealth Maximization:** This approach tries to overcome the limitations of profit maximization. This is the ultimate goal of the financial management. In operational terms it means maximization of profit, maximization of return on capital employed, growth in earning per share or market value of a share or dividends, optimum level of leverage and minimization of cost of capital. This is universally accepted in the modern approach to financial management. We can say that this approach takes into consideration the risk, appropriateness and the time value of money. This concept refers to the wealth of the shareholders as shown by the price of their shares in the market. So it means maximization of the market price of the shares of the firm. The net present worth of the firm can be calculated as follows:

$$W = \frac{A_1}{(1+K)} + \frac{A_2}{(1+K)^2} + \frac{A_n}{(1+K)^n} C$$

Where  $A_1, A_2, \dots, A_n$  = Stream of cash flows expected to occur from a course of action over a period of time;

W = Net present worth

K = appropriate discount rate to measure risk and timing

C = initial outlay to acquire an asset

Therefore, we can say that wealth maximization concept is:

- unambiguous
- measures risk
- considers time value of money
- socially responsible

This objective guides three functions of financial management i.e. investment, financing and dividend. Thus, wealth maximization of shareholders is the main objective and profit maximization can be considered as part of wealth maximization objective.

One thing is to be noted here that if the time period is short and the risk is negligible than profit maximization and wealth maximization are almost the same.

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## 1.6 RISK AND RETURN TRADE-OFF

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There are two main determinants of the prices of a security. These are:

- Risk
- Return

It is said greater the risk, greater the return, so risk and return go together.

In financial management it is very important for the financial manager to understand this concept. This is a guiding factor for decision making. Risk is the measure of uncertainty and can be defined as expected returns from an investment. Let us understand this through an example. Suppose Ms. A invests ₹ 10,000 in a fixed deposit which gives a return of say 6% annually for 3 years.. This means that Ms. A will earn ₹ 600 annually as a fixed amount of interest till the fixed deposit matures.

Now say Ms. A has invested the same amount in share of a firm X which will give her dividend. In this case the dividend varies so it becomes variable. Ms. A will get higher returns if the dividends increase. Though in this case the risk is high because there are chances that in certain cases the firm may not perform well and earn profits and Ms. A may not get dividend. However, the higher the risk, the higher is the return. Returns defined as the gain (or loss) expected over a given period of time by the decision maker. A finance manager has to consider the risk to have greater return so s/he has to 'trade off between risk and return'.

**Risk and Return Trade-Off** : Let us understand this concept with the following example:

**Assumptions:**

- 1) Expected earnings = expected cash flows
- 2) No taxes

Suppose Ms. A has ₹ 1,00,000 out of which ₹ 20,000 is borrowed at the rate of 5%. She wants to open a small cyber cafe. The total operating cost annually is ₹ 100,000 and sales are ₹ 110,000. The financing and operating position of Ms. A is as follows:

1) Financing – Risk and Return	Debt ₹ 20,000	Interest ₹ 1,000
	Own Funds ₹ 80,000	Income ₹ 9,000
2) Operating Risk and Return	Operating costs ₹ 1,00,000	
	Cash Sales ₹ 1,10,000	

At the end of the year Ms. A has ₹ 1,10,000 and reinvests ₹ 1,00,000 in the business, pays interest of ₹ 1,000 and keeps the income of ₹ 9,000 with her. Here you may note that the return is the product of two factors: a) Ms. A here earns ₹ 10,000, b) ₹ 10,000 have been divided between creditor and Ms. A, the owner which affected the owners' return. Based on the return on total assets, Ms. A earned 10% ( $\text{₹ } 10,000/\text{₹ } 1,00,000$ ) and earned a rate of return of 11.25% ( $9,000/80,000$ ) which is the outcome of operating and financing activities.

The rate of return from operations is usually determined by margins and turnover. The margin can be increased by a) increasing sales which should be more than operating expense or b) decreasing operating expenses than sales. A turnover can be increased by increasing sales more than operating assets or reducing operating assets relatively more than sales. Thus there should be a balance between making greater profit for owner against variability of returns.

## 1.7 ROLE OF FINANCE MANAGER

A finance manager has a challenging role to play. His/her functions can be divided into:

- 1) Major Functions
- 2) Other Functions

Functions of Finance Manager	
MAJOR FUNCTIONS	OTHER FUNCTIONS
Estimation of Capital requirements	Maintaining Optimum level of inventory & receivables

Procuring the required funds	Evaluation of investment
Allocation of funds	Financial negotiations
Management of current assets	Track of share prices
Financial Control	

The role of a finance manager is very crucial as s/he has to take into consideration all the finance functions viz. investment decision, financial decisions and dividend decisions. The major function of the financial manager is to see to those finance functions and assess the capital requirements of the firm and then allocate the funds appropriately for the optimum utilization of funds. As part of the minor functions s/he has to keep an eye on the external forces so as to take appropriate decisions. The finance manager has to:

- find the ways and means to procure funds;
- take appropriate investment decisions;
- perform financial forecasting;
- maintain the liquidity position of the organization;
- analyze the financial health of the organization;
- prepare the budgets for the functional areas of the organization;
- manage the payments and receivables;
- frame an appropriate credit policy of the firm;
- take decisions related to depreciation and replacement;
- take decisions related to the associated risks of the funds.

In all finance manager has to analyze, interpret and forecast the funding requirements of the organization.

A finance manager while performing her/his duties comes across many challenges. These challenges can be:

- creating value for shareholders as shareholders have become more aware.
- understanding the psychology of investors both individual as well as institutional;
- managing market risk;
- being smart which implies that s/he possesses effective interpersonal and communication skills and overall knowledge of the organization.

All these challenges have made the job of a finance manager quite challenging.

### **Check Your Progress B**

- 1) Mention the functions of a finance manager.
- 2) What is wealth maximization?

## 1.8 LET US SUM UP

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We now know that financial management is a combination of 'Finance' and 'Management'. It deals with acquiring funds and allocating them wisely for optimum utilization. The evolution of financial management can be divided into three phases (i) traditional phase; (ii) transitional phase; and (iii) modern phase. The nature of financial management involves three functions (i) investment; (ii) financing; and (iii) dividends. The basic goal of financial management is shareholder's wealth maximization as it considers the time value of money and the risks associated with it. We have discussed the risk and return trade-off and the finance manager has to trade-off between risk and return. The role of a financial manager is to: 1. Estimate the amount of capital required; 2. Determine the capital structure; 3. Choose sources of finance; 4. Procure funds; 5. Allocate funds; 6. Utilize funds; 7. Manage cash; 8. Financial control; and 9. Check the external factor etc.

We can therefore say that financial management is the lifeline of any organization.

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## 1.9 KEY WORDS

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**Financial Management:** It is the acquisition, financing and management of funds

**Profit Maximization:** Maximizing firm's profits

**Wealth Maximization:** Maximizing shareholders' wealth

**Risk:** Measures of uncertainty

**Return:** Expected income or loss over a period of time

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## 1.10 SELF -ASSESSMENT QUESTIONS

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- 1) Distinguish between 'Money' and 'Finance'.
- 2) What is Financial Management?
- 3) How has Financial Management evolved as a discipline?
- 4) Discuss the two objectives of Financial Management?
- 5) Explain the concept of 'Risk' and 'Return'.
- 6) Discuss the role of a Financial Manager.

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 2 TIME VALUE OF MONEY**

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### **Structure**

- 2.0 Objectives
  - 2.1 Introduction
  - 2.2 Concept of Time Value of Money
  - 2.3 Factors for Occurrence of Time Value of Money
  - 2.4 Interest
  - 2.5 Future Value
  - 2.6 Present Value
  - 2.7 Annuity
  - 2.8 Perpetuity
  - 2.9 Sinking Fund
  - 2.10 Let Us Sum Up
  - 2.11 Key Words
  - 2.12 Self-Assessment Questions/Exercises
- 

## **2.0 OBJECTIVES**

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After studying this unit, you should be able to:

- understand the concept of time value of money;
  - explain the concept of interest and its types;
  - develop a relationship between interest and future value and present value;
  - discuss the role of time value of money in finding future value and present value; and
  - discuss the sinking fund, annuity and perpetuity.
- 

## **2.1 INTRODUCTION**

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In Unit 1, you have learnt about meaning and nature of financial management. In this Unit, we will discuss time value money (TVM). Time value of money in finance is very important as it helps in decision making. In Unit 1, we discussed that wealth maximization which is one of the objectives of finance is a better option. This is where the concept of time value of money comes into picture. Wealth maximization highlights on the concept of incorporating the benefits of time whereas the profit maximization concept ignores this. This shows that wealth maximization is future oriented as any financial decision taken today has an impact in the future. Let us understand it in this way:

Suppose a company decides to acquire some fixed assets. For this, it needs to pay certain sum to the vendors. The benefits associated with acquiring assets will be spread over the years in future. Now, the question comes as to how the company will procure the funds? This can be done through different sources of finance (we will study this in Unit 3). This will involve cash inflow when the funds will be raised and cash outflows at the time of the payment of funds. So, when the company compares its cash inflows and cash outflows it makes a financial decision. Hence, it is to be noted that time factor is very important when comparing the variables. In this Unit, we will discuss various aspects of time value of money and try to calculate future (compounded) and present (discounted) value of money using different techniques.

## **2.2 CONCEPT OF TIME VALUE OF MONEY**

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In simplest terms, time value of money is the value of a unit of money which is different at different time periods. The money received today is worth more than if received in future. This is one of the important principles of finance which holds true in saying that any amount of money is more the earlier it is received despite having earned certain amount of interest. Time value of money is also referred to as the Present Discounted Value.

If we try to understand this concept keeping in mind the interests of the investors, it can be said that it is preferable to receive the money today than receiving the same amount of money in the future. This is because the money has the capacity to grow in value in future but will be less than the value at present. For e.g. if the money is deposited in a savings account, then it will earn some interest over a certain time period thereby compounding the value of money. At this point, it is very important to understand the factors for the occurrence of time value of money. The subsequent section discusses this concept.

## **2.3 FACTORS FOR OCCURRENCE OF TIME VALUE OF MONEY**

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We now know that as the time passes, the value of money declines. What can be the possible reasons for occurrence of time value of money? There are three basic reasons which can be thought of and these are:

- 1) Inflation
- 2) Risk
- 3) Delay in opportunity cost

All these factors have an impact on the value of money individually as well as in the combined form. Let us discuss these one by one :

- 1) **Inflation** : When we talk about inflation as a common person we always say that ‘due to inflation things have become expensive’. What does it mean? This means that due to inflation, the purchasing power of money

has reduced. For e.g., suppose you have ₹100 to buy petrol 10 years back, then you could have bought more quantity of petrol than if you had the same amount of money today. Therefore, we can say that inflation has a major impact on the time value of money.

- 2) **Risk :** Risk is a measure of uncertainty. When, we think of procuring money in future then we actually are foregoing an opportunity and increasing the risks associated with it. The concept of risk and return we will discuss in Unit 4. In simplest term not taking money today means lending the money. Default risk may be associated with this i.e. the risk of not getting back the money at all or the risk of getting the partial amount back. Therefore, risk is one of the major factors for occurrence of time value of money.
- 3) **Delay in Opportunity Cost:** Time value of money focuses on procuring funds in the present whereas opportunity cost is foregoing one option for another. Due to time value of money opportunity cost is delayed.

## 2.4 INTEREST

What is an interest? It is that amount which accrues (adds on) to the money borrowed/lent at present for a specified period of time. The time period may vary as per the requirement. The time period may range from one week, one month to one year and so on. The time value of money is actually created due to the interest. Now, the question arises as to what is an interest rate?

Rates of interest are usually expressed in percentage terms. They can be 1%, 2%, 10% and so on. It is the rate at which the amount of interest accrues.

**Types of Interest:** There are two types of interests viz: Simple Interest and Compound Interest.

### Simple Interest

Simple Interest is defined as the interest which is accrued only on the actual amount borrowed. The previous interest accrued but not paid/received are not included in the simple interest. The formula to calculate simple interest is:

$$SI = PV \times r \times t$$

Where

SI = Simple Interest

PV= Money borrowed/lent at present

r = Interest Rate

t = Time Period

Let us understand it through an illustration.

### Illustration 1:

**Table 2.1: Computation of Simple Interest (SI)**

	Particulars	6 Months	1 Year	2 Years	3 Years
A	Money Borrowed (₹)	2,00,000	2,00,000	2,00,000	2,00,000
B	Interest Rate Annually (r)	0.10	0.10	0.10	0.10
C	Time Period in Years (t)	0.5	1	2	3
D	SI = PV × r × t (₹)	10,000	20,000	40,000	60,000

### Compound Interest

It is the interest which is accrued on the initial borrowed/lent amount along with the interest which is accrued previously but not paid/received.

To calculate Compound Interest, we use the following formula:

$$CI = FV - PV$$

CI = Compound Interest

FV = Future Value

PV = Present Value

$$A = P (1 + r)^t$$

A = Amount at the end of the period

P = Principal Amount

r = Rate of Interest

t = Time period

Let us now take an example to understand the concept.

### Illustration 2:

Suppose Ms. X invests ₹2,000 at 5 % interest to be compounded annually in a savings bank account. At the end of the year Ms. X will have ₹2,100 in her account. This is the now principal amount which will earn interest next year. This amount will become ₹2,205/- at the end of the next year. This will then become the principal amount for the third year and so on. Table 2.2 shows the procedure of annual compounding:

**Table 2.2: Annual Compounding**

Year	1	2	3
Initial Amount (₹)	2,000	2,100	2,205
Rate of Interest	5%	5%	5%
Compound Interest	100	105	110.25
Beginning Principal (₹)	2,000	2,100	2,205
Ending Principal (₹)	2,100	2,205	2,315.25

The calculations for the same can be done using the formula

$$A = P (1 + r)^t$$

**1<sup>st</sup> Year**       $A = 2,000 (1 + 0.05)^1$   
                        = ₹2,100

**2<sup>nd</sup> Year**       $A = 2,100 (1 + 0.05)^2$   
                        = ₹2,205

**3<sup>rd</sup> Year**       $A = 2,205 (1 + 0.05)^3$   
                        = ₹2,315.25

**CI = FV – PV**

$$\begin{aligned} &= 2,100 - 2,000 = ₹100 \text{ (I<sup>st</sup> year)} \\ &= 2,205 - 2,100 = ₹105 \text{ (II<sup>nd</sup> year)} \\ &= 2,315.25 - 2,205 = ₹110.25 \text{ (III<sup>rd</sup> year)} \end{aligned}$$

Hence, we can say that the principal amount is the present value and the ending amount is the future value.

Now, we need to understand how to calculate the future value (FV) and the present value (PV) based on simple interest.

#### Check Your Progress A

- 1) What is time value of money?

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.....  
.....

- 2) How is simple interest different from compound interest?

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.....  
.....

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## 2.5 FUTURE VALUE

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Interest defines the future value of money. It is the money which is held at present for a given rate of interest in the future.

Therefore,

Future Value of Money = Present value + Interest

$$FV = PV (1 + r)^t$$

FV = Future Value

PV = Present Value

r = Rate of Interest

t = Time Period

Table 2.3 shows the computation of future value at simple interest using the same illustration as used for calculating simple Interest.

**Table 2.3: Computation of Future value (FV) at simple interest**

	Particulars	6 months	1 Year	2 Years	3 Years
<b>A</b>	Money Borrowed (PV) (in ₹)	2,00,000	2,00,000	2,00,000	2,00,000
<b>B.</b>	Simple Interest (₹) (as in Table 2.1)	10,000	20,000	40,000	60,000
<b>C</b>	FV = PV + SI (₹)	2,10,000	2,20,000	2,40,000	2,60,000

### Computation of Future Value and Compound Interest

Let us understand this through following illustration:

What will be the future value and compound interest of an amount of ₹2,00,000 which is borrowed at a compound interest of 10% annually for (i) 1 year (ii) 2 years and (iii) 3 years

#### Solution:

Table 2.4 shows the calculation of future value and compound interest using these formulas:

$$FV = PV (1 + r)^t$$

$$CI = FV - PV$$

**Table 2.4: Computation of Future Value (FV) at compound interest**

Particulars	1 Year	2 Years	3 Years
Present Value (Amount Borrowed) (in ₹)	2,00,000	2,00,000	2,00,000
Rate of Interest	0.1	0.1	0.1
Time Period	1	2	3
Future Value (FV)(₹)	2,20,000	2,42,000	2,66,200
Compound Interest (CI) (₹)	20,000	42,000	66,200

## 2.6 PRESENT VALUE

It is the amount of money received in future (FV) at a given time period (t) which is worth at present. The formula for calculating present value (PV) is as follows:

$$PV = \frac{FV}{(1 + r)^t}$$

### Computation of Present Value (PV) based on simple interest

Let us understand this concept through an illustration.

**Illustration 3:**

Suppose the maturity value of a fixed deposit (FD) is ₹2,60,000. Calculate the initial amount of fixed deposit at which it has been purchased initially. The simple interest rate is 10% and the fixed deposit matures in 3 years.

$$\text{Solution : } \text{PV} = \frac{\text{FV}}{(1 + r)}$$

$$\text{FV} = 2,60,000$$

$$r = 10\% = 0.1$$

$$t = 3$$

Substituting the figures in Equation we get:

$$\text{PV} = \frac{2,60,000}{[1 + (0.1 \times 3)]}$$

$$\text{PV} = \frac{2,60,000}{1.3} = ₹2,00,000$$

Therefore, PV is ₹2,00,000 for the fixed deposit.

**Now, let us calculate PV at compound interest**

Let us use the following illustration to understand the same.

**Illustration 4:**

What will be the present value (PV) of a fixed deposit which has a maturity value of ₹26,620? Also calculate the initial amount of the fixed deposit if the interest is compounded annually at the rate of 10% with a maturity period of 3 years.

**Calculating Present Value at Compound Interest**

The formula for calculating PV, using Compound Interest is :

$$\text{PV} = \frac{\text{FV}}{(1 + r)^t}$$

Using the formula, we substitute the values as follows :

$$\text{FV} = 26,620$$

$$r = 10\% = 0.1$$

$$t = 3 \text{ years}$$

$$\text{PV} = \frac{26,620}{(1 + 0.1)^3} = \frac{26,620}{1.331}$$

$$= ₹20,000$$

The fixed deposit was purchased for ₹20,000.

## Effective Rate of Interest

It is a rate at which the money held at present increases in a year. There are cases where interest is compounded more than once in a year. In these cases, the effective interest rate varies. The formula for calculating effective rate of interest is :

$$FV = [1 + (r/t)]^t \text{ then effective rate of interest} = (FV - 1)$$

### Illustration 5:

Calculate Effective Rate of Interest if Rates of Interest is 10% in each of the following cases:

- Case (a)** When interest is compounded half yearly (twice a year)
- Case (b)** When interest is compounded quarterly (four times a year)
- Case (c)** When interest is compounded monthly (12 times a year)
- Case (d)** When interest is compounded twice in month (24 times a year)
- Case (e)** When interest is compounded daily (365 days)

Solution:

**Table 2.5: Effective Rate of Interest for different cases**

Particulars	Case (a)	Case (b)	Case (c)	Case (d)	Case (e)
Interest Rate (A) (1/10%)	0.10	0.10	0.10	0.10	0.10
Number of Compounding per year (t) (B)	2	4	12	24	365
Applicable Interest Rate (r) (A/B)	0.05	0.025	0.0083	0.00416	0.00027
Future Value (FV) = $(1 + r)^t$	1.1025	1.1038	1.1047	1.10494	1.10515
Effective Rate of Interest = $(FV - 1)$	0.1025	0.1038	0.1047	0.10494	0.10515

### Illustration 6:

What will be future value and effective rate of interest of ₹1 if rate of interest is r and number of compounding is infinite times a year.

**Solution:**

Infinity is represented as n to the power n

$$[1 + (1/n)]^n = e$$

$$\text{Hence, } [1 + (r/n)]^n = [1 + \{1/(n/r)\}]^{(n/r)} = e$$

As n reaches infinity n/r also reaches infinity

$$\text{Hence } [1 + \{1 / (n / r)\}]^{(n/r)}$$

Therefore  $[1 + (r/n)]^n = e^r$  = Future Value (FV)

Effective Rate of Interest = FV - 1 =  $e^r - 1$

Therefore, future value and effective rate of interest for ₹1 is  $e^r$  and the effective rate of interest is  $e^r - 1$

### Illustration 7:

What will be the future value if initial amount invested is ₹1, rate of interest is  $r$ , number of compounding is  $n$  times a year and maturity period is  $m$  years.

#### Solution:

Future Value of ₹1 after 1 year (FV) =  $[1 + (r/n)]^n$

$$\begin{aligned}\text{Future Value of ₹1 after } m \text{ years} &= (\text{Future Value after 1 year})^m = [1 + (r/n)]^m \\ &= [1 + (r/n)]^{nm}\end{aligned}$$

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## 2.7 ANNUITY

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A series of equal amount of cash flows over a certain period of time is called an annuity. A promise to pay ₹5,000 a year for 10 years is a 10 years annuity. Let us see the illustration.

### Illustration 8:

What will be present value of an annuity of amount  $A$  for  $n$  years at an effective rate of interest of  $r$ ?

#### Solution

Present value of an annuity (PV)

$$\begin{aligned}&= \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \frac{A}{(1+r)^3} + \dots + \frac{A}{(1+r)^n} \\ &= \frac{A}{(1+r)} \left[ 1 + \frac{1}{(1+r)} + \frac{1}{(1+r)^2} + \dots + \frac{1}{(1+r)^{n-1}} \right]\end{aligned}$$

These terms are expressed in geometric progression

$$\text{Therefore, } PV = A / (1+r) \left[ \frac{1 - (1/(1+r))^n}{1 - (1/(1+r))} \right]$$

$$PV = A / (1+r) \left[ \{(1+r^n - 1) / (1+r)^n\} / \{(1+r - 1) / (1+r)\} \right]$$

$$PV = A / (1+r) \left[ \{(1+r^n - 1) / (1+r)^n\} / \{r / (1+r)\} \right]$$

$$PV = A / [(1+r)^n - 1] / r(1+r)^n$$

$$PV = \frac{A}{r} \left[ 1 - \frac{1}{(1+r)^n} \right]$$

## Present Value of an Annuity

When we talk about present value of annuity, we compute the even series of cash flows. Let us now see an illustration to understand the concept of present value of an annuity.

### Example:

Suppose you have ₹600 at the end of each of three years. If the discount rate is 10%, what will be the present value of ₹1,800?

### Solution:

We know that present value of a future cash flow is known as ‘Discounted Cash Flow’ (DCF). To find out present value, we have two methods:

#### Method 1:

PV of an annuity is the sum of all the present value of the inflows of annuity which is explained as follows:

$$\begin{aligned} & 600 \left(\frac{1}{1.1}\right)^1 + 600 \left(\frac{1}{1.1}\right)^2 + 600 \left(\frac{1}{1.1}\right)^3 \\ & = 600 \times 0.9091 + 600 \times 0.8264 + 600 \times 0.7513 = 1,492.08 \end{aligned}$$

#### Method 2:

In this method, we multiply annuity amount with annuity present value interest factor. Using the table for annuity present value interest factor for ₹600 @ 10% for 3 years is 2.48685

$$\therefore 600 \times 2.48685 = ₹1,492.11$$

This is the present value of an annuity.

## Future value of an annuity

**Future Value of Annuity can be calculated by the following formula:**

$$FVA = A \left[ \frac{(1+r)^n - 1}{r} \right]$$

Example: If ₹6,000 are deposited at the end of each year for 6 years at the rate of interest of 10%, the future value of annuity will be ₹46,296. Let us see, how it is calculated:

$$\begin{aligned} FVA &= 6000 \left[ \frac{(1+0.10)^6 - 1}{.10} \right] \\ &= 6000 \left[ \frac{(1.7716-1)}{.10} \right] \\ &= 6,000 \times \frac{.7716}{.10} \\ &= 6000 \times 7.716 \\ &= ₹. 46,296 \end{aligned}$$

Here we can also find out the rate of interest (r). Let us see the example:

If a lump-sum of ₹2,00,000 is received at the end of 9 years after paying ₹10,000 for 9 years, what will be the value of r.

First find FVIFAr,n

$$2,00,000 = 10,000 \times FVIFAr, 9$$

$$\begin{aligned} FVIFAr, 9 &= \frac{2,00,000}{10,000} \\ &= 20 \end{aligned}$$

Now look at the future value annuity table and see the row corresponding to 9 years until you find value close to 20. It is 20.799 and is below the column of 20%. Therefore, interest rate (r) is 20%.

### Present Value of an Annuity due

It is the present value of an ordinary annuity that has been brought back one period too far i.e. if you want to have present value of one period later than the ordinary annuity value then you should compound it one period forward.

Therefore, the formula is expressed as under:

$$PVAD\ n = \text{ordinary annuity present value} \times (1 + r)$$

### Let us understand this through an illustration:

#### Illustration 9:

Calculate the present value of an annuity due for ₹2,000 annuity 10% for 3 years.

#### Solution:

We will calculate ordinary annuity as well as present value of an annuity due.

$$PVA = \frac{A (1 + r)^n - 1}{N (1 + r)^n}$$

A = annuity amount

r = rate of interest

N = number of years

PVA = present value of annuity

$$\begin{aligned} PVA &= \frac{2000 (1 + 0.1)^3 - 1}{0.3 (1 + 0.3)^3} = \frac{662}{0.6591} \\ &= 1,004.39 \end{aligned}$$

$$PVAD\ n = PVA \times (1 + r)$$

$$PVAD\ n = 1004.39 \times (1+0.1) = ₹1104.829$$

## 2.8 PERPETUITY

When the cash flow is for an indefinite period, it is called perpetuity. Preference shares which carry certain fixed rate of dividend is payable for a long period. It is a special type of annuity. Its present value can be found by dividing cash flow by discount rate. For example, if you get an offer of a perpetual cash flow of ₹3,000 every year and return required is 15%. The value of perpetuity will be:

$$\text{PV of Perpetuity} = A/r$$

$$= \frac{3000}{0.15} = ₹ 20,000$$

It means if ₹20,000 is invested at 15% rate of interest, it will give a yearly income of ₹3,000 every year.

### Illustration 10:

What will be the present value of an annuity of ₹1,00,000 receivable for 5 years at an effective rate of interest of 12% annually?

#### Solution:

Present value of an annuity of ₹1 for five years

$$= \frac{A}{r} \left[ 1 - \frac{1}{(1+r)^n} \right] = \frac{1}{0.12} \left[ 1 - \frac{1}{(1+0.12)^5} \right]$$

$$= 8.3333 [1 - 0.5674] = 8.3333 \times 0.4326 = 3.605$$

Hence, PV of an annuity of ₹1,00,000 = ₹1,00,000 × PV of an annuity of ₹1

= ₹1,00,000 × 3.605 (from table of PVA or as calculated above)

$$= ₹3,60,500$$

### Illustration 11:

What will be the present value of perpetuity of amount A for infinite period at an effective rate of interest r?

#### Solution:

The present value of perpetuity is calculated as in annuity.

Present value of perpetuity (PV)

$$\begin{aligned} &= \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \frac{A}{(1+r)^3} + \dots \dots \dots \frac{A}{(1+r)^n} \\ &= \frac{A}{(1+r)} \left[ 1 + \frac{1}{(1+r)} + \frac{1}{(1+r)^2} + \dots \dots \frac{1}{(1+r)^{n-1}} \right] \end{aligned}$$

These terms are expressed in geometric progression.

Therefore, Therefore,  $PV = A / (1+r) [ \{1 - (1/(1+r))^n\} / \{1 - (1/(1+r))\} ]$

$$PV = A / (1+r) [ \{(1+r^n - 1) / (1+r)^n\} / \{(1+r - 1) / (1+r)\} ]$$

$$PV = A / (1+r) [ \{(1+r^n - 1) / (1+n)^n\} / \{r / (1+r)\} ]$$

$$PV = A / [(1+r)^n - 1] / r(1+r)^n$$

$$PV = \frac{A}{r} \left[ 1 - \frac{1}{(1+r)^n} \right]$$

As  $n$  tends to infinity,  $[1 / (1 + r)^n]$  tends to zero therefore PV of a perpetuity  $= (A / r)$

### Illustrartion 12:

What will be the present value of perpetuity ₹1,50,000 per year for infinite period at an effective rate of interest of 10% annually?

#### Solution:

$$\text{Future Value (FV)} = PV (1 + r)^n$$

$$6,35,250 = PV (1 + 0.12)^5$$

$$PV = 6,35,250 / (1.12)^5 = 6,35,250 \times 0.5674 \text{ (approx.)} = ₹3,60,441$$

## 2.9 SINKING FUND

It is a fund which is created to accumulate a specific amount for future in form of regular periodic payments for a cause. The formula to calculate future value of annuity is used.

### Illustration 13:

What will be the amount required to invest every year so as to accumulate ₹10,00,000 at the end of 5 years if the effective rate of interest is 12% annually.

#### Solution:

$$A = 10,00,000 \quad r = 12\%$$

$$A/R = \frac{10,00,000}{0.12} = 8.3333$$

Future value of an annuity of Re. 1 after 5 years =

$$\left( \frac{A}{r} \right) [ (1+r)^n - 1 ] = \frac{1}{0.12} [ 1 + 0.12 ]^5 - 1$$

$$= 8.3333 (1.7623 - 1) = 8.3333 (0.7623) = 6.3525$$

Let the amount of an annuity be 'x'

$$\text{Therefore, } 6.3525x = 10,00,000$$

$$X = 10,00,000 / 6.3525 = 1,57,418$$

Hence, amount required to be invested every year is ₹1,57,418

### How to read the Compound Value and Present Value Tables

In general there are four types of tables which are available at the end of every finance book. These are given below:

Types of Tables	Objectives
FVIF Table – future(Compounded) value of Sum of ₹1	To find out the compounded value of a sum invested today at the end of n <sup>th</sup> year
FVIFA Table Future (Compounded) value of Annuity of ₹1	To find out the compounded value if an Annuity (i.e. a series of an equal sum invested at the end of each year), for n <sup>th</sup> year
PVIF Table – Present Value of ₹1	To find out the present value of a Future Sum to be received at the end of nth year
PVIFA Table Present Value of Annuity of ₹1	To find out Present Value of an Annuity (i.e. a series of an equal Future Sum to be received at the end of each year) for n <sup>th</sup> years

Notes.

First Row represents Rates of interest like 1%, 2% ..... & so on.

First column represents Years like 1,2,3, & so on.

To find out the value of a specific of a table (FVIF, FVIFA, PVIF and PVIFA), you need to look under the specific rate of interest for a particular year.

### Reading FVIF Table

To find out the future (compounded) value of ₹1( invested now) at the end of 2<sup>nd</sup> year at 10% Rate of interest, look under 10% Rate of interest column and the 2<sup>nd</sup> year row. The (Compounded) interest value is ₹1.210.

**Table FVIF: (Compounded) value of Re. 1 at the end of nth year (₹ 1 invested in the beginning)**

Rate of Interest	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Year 1	1.010	1.020	1.030	1.040	1.050	1.060	1.070	1.080	1.090	1.110
<b>2</b>	1.020	1.040	1.061	1.082	1.103	1.124	1.145	1.166	1.188	<b>1.210</b>

### Reading FVIFA Table

To find out the future (compounded) value of an annuity of ₹1 (be invested at the beginning of each year) for 2 years at 8% Rate of interest, look under 8%

Rate of Interest Column and the 2<sup>nd</sup> year row. The Compounded Value is ₹2.080

Time Value of Money

**Table FVIFA: Compound Value of an Annuity of ₹1 invested at the end of each year.**

Rate of Interest	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Year 1	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
<b>2</b>	2.010	2.020	2.030	2.040	2.050	2.060	2.070	<b>2.080</b>	2.090	2.100

### Reading PVIF Table:

To find out the present Value of ₹1 to be received at the end of 1<sup>st</sup> year at 5% Rate of interest, look under 5% Rate of interest Column and the 1<sup>st</sup> year row. The present Value is 0.952.

**Table PVF. Present Value of ₹1 receivable at the end of the nth year**

Rate of Interest	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Year 1	0.990	0.980	0.971	0.962	<b>0.952</b>	0.943	0.935	0.926	0.917	0.909
<b>2</b>	0.980	0.961	0.943	0.925	0.907	0.873	0.873	0.857	0.842	0.826

### Reading PVIFA Table:

To find out the present value of Annuity of ₹1 (to be received at the end of each year) for 2 years at 5% Rate of Interest, look under 5% rate for interest column and the 2<sup>nd</sup> year row. The present value is ₹1.859

**Table PVIFA: Present Value of an Annuity of Re. 1 receivable at the end of each year**

Rate of Interest	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
Year 1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
<b>2</b>	1.970	1.942	1.913	1.886	<b>1.859</b>	1.833	1.808	1.783	1.759	1.736

## 2.10 LET US SUM UP

Time value of money is the basis for financial decision making. It is important as it shows that the value of money is different at different time periods. The value of a certain amount of money at present is more valuable than its value after a certain time period. This difference between present value and future value is the time value of money. This concept is also known as present discounted value. In this unit we have also learnt different types of interests and how they can be put to use to calculate the present value and the future value. Future value is compounded and present value is discounted. In the later sections we have tried to understand the concepts of annuity, perpetuity and sinking funds. We have also learnt how to read the different tables.

## 2.11 KEY WORDS

**Time Value of Money:** Unit of money which is different at different time periods.

**Simple Interest:** Interest accrued only at the original amount borrowed.

**Compound Interest:** Interest which earns interest along with the capital amount.

**Future value:** It is the cash value of an investment at some time in future

**Present Value:** It is the correct value of future cash flows discounted.

**Annuity:** A series of equal amount of cash flows over a certain period of time.

## 2.12 SELF-ASSESSMENT QUESTIONS/ EXERCISES

- 1) What is Time value of money? Explain.
- 2) Discuss different types of interest.
- 3) What is annuity? How is it related to interest?
- 4) Explain Future value and Present value giving examples.
- 5) Mohit is contributing ₹10,000 every year to a retirement account. He is getting interest at the rate of 8%. If he retires after 30 years, what will be the future value of this amount?  
(Answer= ₹11,32,800)
- 6) How much Anil should save annually to accumulate ₹5,00,000 for his son's education by the end of 10 years, if the interest rate is 8%?  
(Answer = ₹34,513.70)
- 7) Ramesh makes an investment in mutual funds. The expected cash flow for 5 years are as given below. Find the present value of cash flows:

Year	Cash Flow (Amount in ₹)
1.	10,000
2.	20,000
3.	20,000
4.	30,000
5.	30,000

(Answer = ₹79,762)

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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# **UNIT 3 SOURCES OF FINANCE**

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## **Structure**

- 3.0 Objectives
  - 3.1 Introduction
  - 3.2 Classification of Sources of Finance
    - 3.2.1 Classification Based on Time Period
    - 3.2.2 Classification Based on Ownership and Control
    - 3.2.3 Classification Based on Source of Generation
  - 3.3 Long-Term Sources of Finance
  - 3.4 Short-Term Sources of Finance
  - 3.5 Let Us Sum Up
  - 3.6 Key Words
  - 3.7 Self-Assessment Questions
- 

## **3.0 OBJECTIVES**

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After studying this unit, you should be able to :

- classify sources of finance;
  - describe various types of long-term sources of finance and their features; and
  - describe various types of short-term sources of finance and their features.
- 

## **3.1 INTRODUCTION**

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In the previous units we have learnt the concept of finance and time value of money. We have learnt the importance of time in describing financial management. In this unit we will broaden our concept through various types of sources of finance. Now the question arises as to why do we need to learn sources of finance? The answer to this question is that each and every organization needs finances to meet different types of financial needs. Even an individual like us needs finances be it for a shorter time period or for a longer time period. This is where the concept of sources of finance comes into picture. The organization needs short-term sources of finance to fulfil short-term financial needs, medium-term sources for medium-term needs and long-term sources to fulfil long-term financial needs. Based on the need, the organizations raise the funds. The funds can be in form of trade credits, loans, equity, debentures etc. These sources are used in different situations. In this unit you will learn different types of sources of finance and concentrate on long-term and short term-sources of finance.

## 3.2 CLASSIFICATION OF SOURCES OF FINANCE

Before we discuss different type of sources of finance in detail, let us see classification of the sources of finance. For any organization choosing a right source and the right mix is quite challenging. Therefore, the organization should have different types of sources of finance. The sources of finance are classified based on the following:

- a) Time period
- b) Ownership and control
- c) Source of generation

### 3.2.1 Classification Based on Time Period

When we discuss the sources of finance based on time period. We classify them into three categories viz. (Figure 3.1).

- Long-term
- Medium-term
- Short-term

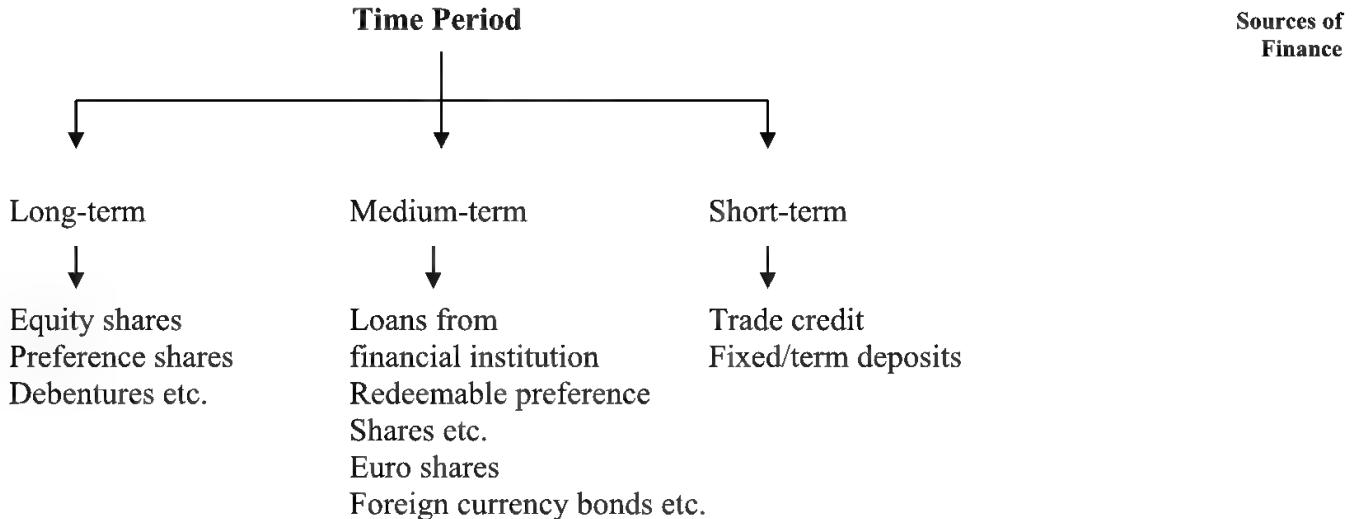
**Long-term sources :** These are the finances where time period exceeds 5 years. These types of finances are basically used for working capital like plant, building etc. Some of the examples of such finances are equity, preference shares, debentures, venture capital funding, lease financing etc.

**Medium-term sources:** The time period of these types of finances is between 1 to 5 years i.e. they are available for more than 1 year but less than 5 years. Such kind of finances is required for expenses like promotional expenses of the organization. Some examples are redeemable debentures, redeemable preference shares, loans from financial institution etc.

As we now known there are internal and external sources of fund generation. Some of the external sources of funds can be procured through international financing and the period of these funds is within 5 years. Some of the ways to raise external sources of funds are as follows:

- 1) Commercial Banks
- 2) Development banks and financial institution
- 3) Discounting of trade bills
- 4) Euro shares/bonds
- 5) Foreign Direct Investment etc.

**Short-term sources:** These types of finances usually remain for a period of 1 year and are normally used for financing temporary working capital of organizations. Some of the examples of such type of finances are trade credit, overdraft, fixed/term deposits, cash credit etc.



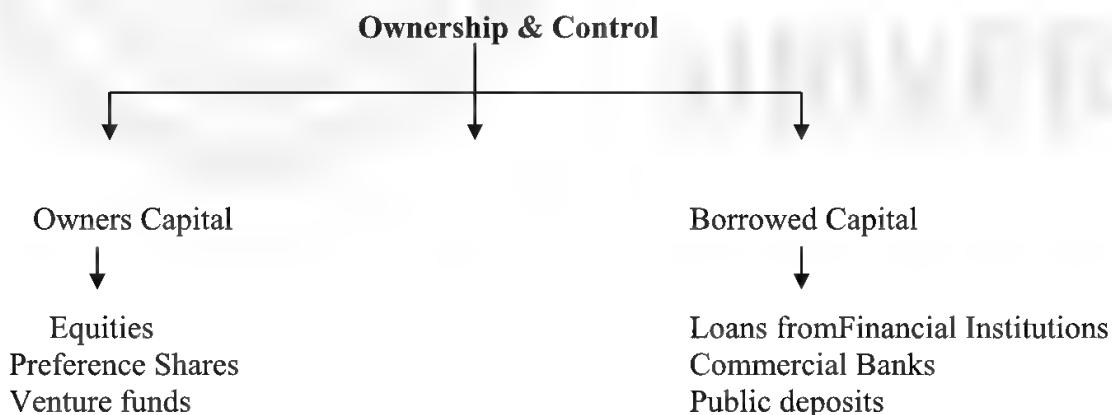
**Figure 3.1 Classification Based on the Time Period**

### 3.2.2 Classification based on Ownership and Control

Ownership and control are important parameters while selecting a specific source of finance for any organization. There are two categories in this type of finance (**figure 3.2**).

- a) Owners' Capital
- b) Borrowed Capital

Owners' Capital involves finances like equities, preference shares, venture capital to name a few. Borrowed capital as the name suggests includes money borrowed from financial institutions, commercial banks or raising funds through public.



**Figure 3.2: Classification based on Ownership and Control**

The control in case of owners' capital is higher than the borrowed capital and it is a long term finance whereas in borrowed capital the control is with the borrower.

### 3.2.3 Classification Based on Source of Generation

When we talk about the source of generation of funds it is important to understand the internal and external sources of finance.

**Internal Sources:** These are the sources in which the funds are generated by the organization itself. In this case the dependency on the outside parties is nil and the ownership is not diluted. Some examples of such type of funds are: retained profits, control of working capital, sale of assets etc.

**External Sources :** This type of finance is generated outside the organization. The organization has to take a crucial decision to find out the right mix of external sources of funds. The best example of external sources is the loans which can be procured through various ways. Figure 3.3 depicts the classification based on source of generation.

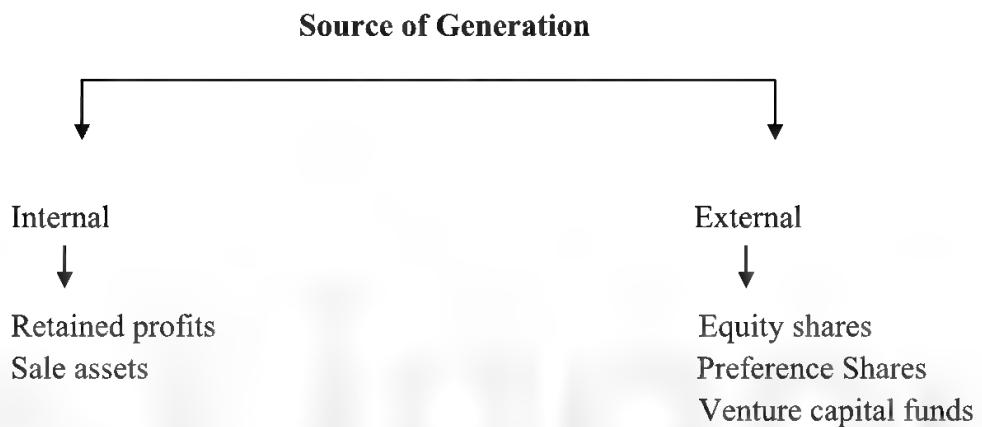


Figure 3.3: Classification based on source of generation

#### Check Your Progress A

- 1) List different sources of finance.

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- 2) What are the short term sources of finance ?

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### **3.3 LONG-TERM SOURCES OF FINANCE**

Let us now discuss the most common long-term sources of financing. These are

- Equity Shares
- Preference Shares
- Debentures
- Venture Capital
- Lease Financing
- Warrants

**Equity Shares :**Equity share can be defined as the share which does not have two major preferential rights. What are these rights? These are

- Right to receive dividend
- Right to receive payment of capital

When the capital is raised through equity shares this is known as equity share capital and the contributors towards such capital are known as equity shareholders.

The company's article of association states the amount authorised as share capital. A company issues shares of equal values amounting to the value of authorised capital. However it may not issue all shares upto the authorised amount. Any amount of authorised capital not issued is known as unissued capital. It is classified as long term of source of finance as it does not have any maturity.

Let us now see the major advantages and disadvantages of equity shares. Table 3.1 and 3.2 gives a bird's eye view to understand the advantages and disadvantages of equity shares with respect to the organization and the shareholder.

**Table 3.1 – Advantages and Disadvantages of equity shares with respect to the organization.**

Advantages	Disadvantages
<ul style="list-style-type: none"> <li>• Permanent capital</li> <li>• Not have fixed obligation to pay dividends</li> <li>• Does not have security on assets</li> <li>• Has the capacity to raise debts further</li> <li>• Risk of financial insolvency is negligible</li> </ul>	<ul style="list-style-type: none"> <li>• Involves high cost as compared to debt capital</li> <li>• Diluted control</li> <li>• Risk associated with hostile takeover</li> <li>• Increase in agency cost</li> </ul>

**Table 3.2: Advantages and Disadvantages with respect to the shareholder**

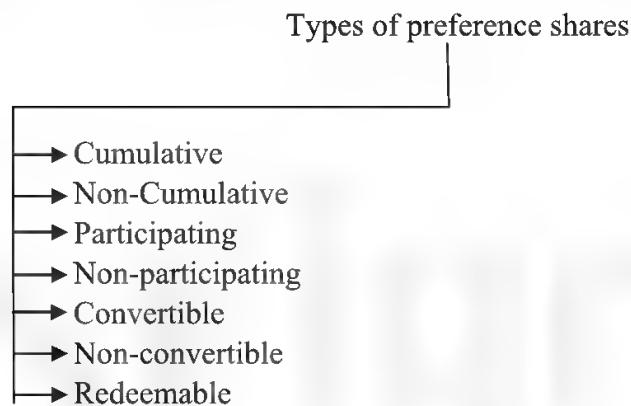
Sl. No.	Advantages	Disadvantages
1.	Share holders have voting rights	Uncertainty involved with the earnings
2.	Shareholders have the possibility of getting high dividends during profitable years	High risks
3.	Possibility of getting bonus shares	Participation in management is negligible
4.	Capital appreciation	No security
5.	High liquidity	Control on increase in dividend is nil.

**Preference Shares :** Unlike equity shares, the preference shares have the following two rights as per Section 85 of the Companies Act.

- c) Right to receive dividend
- d) Right to receive payment of capital

Preference shares also have the features of equity shares and the debt capital. It is like equity shares as the dividend like equity is non-taxable and like debt-capital as the rate of preference dividend is fixed.

Let us now see the different types of preference shares. The one of each kind of preference share itself depicts the meaning of that preference shares. Figure 3.3 shows the classification of preference shares.



**Figure 3.3: Types of preference shares**

Let us explain them:

- 1) **Cumulative Preference Shares :** In this type of share, the arrears of dividend accumulate if the dividend is not paid in any year, i.e. if profits are insufficient to pay full dividend. The unpaid dividend constitutes a chain which gets priority over dividends on common/equity shares. The dividend on equity shares are not paid till there are arrears of dividend on preference shares.
- 2) **Non-Cumulative Preference Shares:** As the name suggests, in these shares the arrears of the dividend does not accumulate. If the dividend is not possible to be paid in any year, it is lost.
- 3) **Participating Preference Shares:** This kind of share has two additional rights apart from the usual right of preference shares. These rights are:
  - a) Right to participate in surplus profits
  - b) Right to participate in surplus assets
- 4) **Non-Participating Preference Shares:** As the name suggests, these types of shares are non-participating. Preference share is always considered to be a non-participating share unless states otherwise.
- 5) **Convertible Preference Shares:** These include the right to convert the shares into equity shares after a specific period into a certain ratio. However most preference shares are convertible at the option of the

company. In this case, the investor has the option of converting into equity shares or redemption.

- 6) **Non-Convertible Preference Shares:** In contrast to convertible preference shares, these shares do not confer right to convert the shares into equity shares to the holder.
- 7) **Redeemable Preference Shares:** These are the shares which can be redeemed. Preference shares are redeemable when they have limited life after which the company has to redeem them. As per the amendments to the Companies Act, 2013, no preference share can be irredeemable.

Now, let us see the advantages and disadvantages of the preference shares with respect to the organization as well as the shareholders. Table 3.3 and 3.4 describes the same.

**Table 3.3: Advantages and Disadvantages of the preference shares with respect of the organization**

Sl. No.	Advantages	Disadvantages
1.	Dividend is payable at fixed rate	Cost is higher than debt
2.	Do not have voting rights	It is not a permanent capital
3.	No security	Does not attract small investors
4.	Risk of financial insolvency is nil	
5.	Low cost	

Let us now see the advantages and disadvantages of preference shares with respect to shareholders as given in Table 3.4

**Table 3.4 : Advantages and Disadvantages with respect to shareholders**

Sl. No.	Advantages	Disadvantages
1.	Preference rights to payment of dividends	No voting rights
2.	Preference rights to payment of capital	No capital appreciation
3.	Fixed dividend	No increase in dividend
4.	In cumulative preference shares, the dividend accumulates	

### Debentures

Debenture is a written instrument which acknowledges a debt and contains provisions as regards to the repayment of principal and payment of a fixed interest rate. Debt is represented by a debenture. As per Section 2 (30) of the Companies Act 2013, “debenture includes debenture stocks, bonds or any other instrument of a company evidencing a debt, whether constituting a

charge on the assets of company or not". The main characteristics of debenture are:

- 1) Fixed interest is payable on debenture.
- 2) It does not have voting rights.
- 3) It can be redeemed during the life of the company.

### Types of Debentures

Debentures can be classified into different categories based on the conditions of issue and redemption. The debentures can be of following types:

1. **Naked or unsecured debentures:** These are not secured on any asset. The ones who hold these debentures are treated as ordinary creditors.
2. **Secured debentures:** These are secured on a particular asset or secured on the assets of the company in general.
3. **First Mortgage debentures:** These are the ones which have a first claim on the assets charged.
4. **Second Mortgage debentures:** These have the claim on the assets charged after the claim of first-mortgage debentures.
5. **Redeemable debentures:** These are the ones which can be repaid after a specific period. The repayment can be one time or in instalments during the lifetime of the company.
6. **Irredeemable or perpetual debentures:** These cannot be redeemed during the lifetime of the company. They are repayable on the winding up of a company or on the expiry of a long time.
7. **Registered debentures:** These are the debentures which are payable to persons who are registered debenture holders. These are transferrable through a transfer deed but the interest is paid to the registered holder.
8. **Bearer debentures:** These are payable to the bearer and are freely transferrable by delivery. The unregistered debentures are bearer debentures. Interest is paid to the one who is the bearer of the coupon attached to these debentures.
9. **Convertible debentures:** These have the right to convert them into shares. These can be **fully convertible** or **partially convertible**.
10. **Non-Convertible debentures:** These cannot be converted into shares.

There are advantages and disadvantages associated with debentures with respect to the organization. These are represented in table 3.4.

**Table 3.4 : Advantages and Disadvantages of debentures with respect to the organization**

Sources of  
Finance

Sl. No.	Advantages	Disadvantages
1.	Low cost of debt as interest is tax deductible	Interest is paid even if there is loss
2.	No risk of loss of control	They are to be redeemed after a fixed time
3.	Advantage of trading on equity	Increase the risk of shareholders if return on asset is less than cost of debt.

### Check your Progress B

1. What are equity shares?

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2. List the advantages of preference shares.

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### Venture Capital

This is a form of financing which has grown in the past two decades. With the start-ups coming up the concept of venture capital has taken a leap. It is a form of financing for new and highly likely ventures. The ventures are usually promoted by qualified entrepreneurs who do not have much experience and funds to implement their ideas.

Venture capital is a form of equity financing method used in relatively new companies when it is too early for them to go public. It can be in the form of equity investment or loan financing/convertible debt.

This type of investment is generally long term. Long term capital is injected to ensure the business is able to grow.

The venture capitalists are also actively involved in business functioning by providing their relevant skills and inputs but do not interfere in the management of the company.

This is a high risk-return investment. Generally venture capitalists invest in multiple businesses hence their risk-return is adjusted with one business compensating for the loss of the other. The returns are made through capital gains at the time of exit.

Let us now understand steps of venture capital financing and growth of venture capital finance.

### Stages of Venture Capital Financing

Stages	Name	Stages of Project
I	Seed	Conceptualization/planning
II	Start-up	Operational/production
III	I round /Expansion	Expansion in production/marketing
IV	II round / Mezzanines	Last stage before public offering
V	III round / Buy-out	Acquisition of a product line business
VI	IV round / Turnaround	Re-establishment of business

*Source: Agrawal, Neeti & Gosain, Surbhi (2019). Venture Capital Financing: Then and Now. Uppal books, New Delhi*

### Stages of Growth and Venture Capital Finance

S.No	Stages	Period Involved of Realization (In Years)	Degree of Risk	Finance for the Activity Involved
<b>Early Stage Investment</b>				
I	Seed capital	7-10	Extreme	Manufacturing & Research base
II	Start-up	5-10	Very high	Commencement of business activity
III	1 <sup>st</sup> stage	4-6	High	To meet demand
IV	2 <sup>nd</sup> stage/follow-up	3-7	High	Marginal progress
<b>Later Stage/Third Investment</b>				
I	Development /Expansion finance	1-3	Medium	Expansion
II	Replacement/Money-out deal	2-4	Low	Planned exit
III	Turn-around /Recovery finance	3-5	Medium to High	Rescue Finance
IV	Bridge Finance	1-3	Low	Company planning to go public
V	Management/ Leverage buy-out	1-3	High	New management

*Source: Agrawal, Neeti & Gosain, Surbhi (2019). Venture Capital Financing: Then and Now. Uppal books, New Delhi*

Usually the funding is done at the inception stage and the venture capital financers keep a close watch on the firm's performance. Their investment is in the form of ownership funds and this becomes the permanent capital of the

firm. The stages are self-explanatory in nature and describe the growth of venture funds in different stages.

### Lease Financing

Lease financing is an important source of long term as well as medium term source of financing. It is a form of financing where the owner of a particular asset gives the right to another person to use that particular asset in lieu of the payments periodically. In other words, "a lease is a contract whereby the owner of the asset grants the other party the exclusive right to use the asset, usually for a specified period in return for the payment of rent." The ownership remains with the owner only. There are certain related terms which are important to understand the concept of lease financing.

**Lease:** It is an agreement where an owner gives the rights to the user for using that asset on the basis of periodic rentals being paid for a specific period of time.

**Lessor:** A person who owns the assets and grants the rights to the user;

**Lessee:** A person who acquires the rights to use the assets;

**Lease rentals:** Periodic payments for agreed period of time;

**Lease Term:** It is a non-cancellable period for which the lease agreement has been made.

Usually the lease is non-cancellable but can be cancelled during emergency with the permission of the lessor.

There are two types of lease.

- Finance lease
- Operating lease

**Finance lease :** This lease is also called as full payment lease, capital lease, or long term lease.

- The lease period is for the maximum part of the economic life of an asset;
- All the substantial risks and rewards to ownership of an asset are transferred to the lessee;
- The obsolescence risk lies with the lessee;
- Certainty in continuation of the lease;
- The contract is non-cancellable. The lessee has to pay the lease rents till the expiring of the lease period.
- Annual maintenance cost is usually borne by the lessee.

**Operating lease:** It is also called short term, service or maintenance lease.

- It is not for the maximum part of the economic life of an asset, generally less than that;

- All the substantial risks and rewards to ownership of an asset are not transferred to the lessee;
- The lessor has to maintain the asset in good working condition;
- The obsolescence risk lies with the lessor;
- Uncertainty in continuation of the lease;
- The contract is cancellable;
- Annual maintenance cost is usually borne by the lessor.

### **Advantages of Lease Financing:**

- Whenever an asset is acquired, there is always the risk of obsolescence, and that said asset might become obsolete before the completion of its service life. In case the firm acquires the asset on lease, the risk of obsolescence lies on the owner of the asset. However firms also need to be cognizant of the fact that the owner in fact knows the true value of the equipment that is leased, so they may charge in accordance to the risk involved.
- The firm enjoys the convenience of not having to pay for the asset immediately and can further acquire other assets by methods of lease financing. In-case the firm had acquired the asset through debt financing, it would have to comply to different terms and conditions which are stipulated in the bond agreement. In case of lease financing the restrictions are far lesser than a loan.
- When a firm takes a loan to purchase an asset, both asset and the loan are part of the debt. However in case of lease financing, the obligation does not appear as debt on the balance sheet. Thereby strengthening the borrowing capacity of the firm.
- Lease financing works as a tax shield for the firm since it reduces tax liability. When an asset is acquired on lease, the full amount of lease payment is deductible for tax purposes, and if the company had brought the asset, it would entitle to deduct depreciation and interest expenses. The former method is much more beneficial for the company.

### **Disadvantages of Lease Financing**

- In the long run, all benefits and limitations of debt financing apply to lease financing as well.
- There is deprivation of profits on account of appreciation in the value of assets. This is because the ownership lies at the hands of the lessee.
- It is costlier than buying on credit.
- This form of lease financing has long term legal obligations as the firm will still have to pay for the asset even if it ceases its operations.

### **Warrants**

Stock warrants are the derivatives which give the right to the investors but not the obligation to buy or sell the security before its expiry. The price is

specific at which the warrant can be bought or sold. The price at which the underlying security is bought or sold is known as the ‘exercise price’ or ‘strike price’. There are two types of warrants. These are:

- Call warrant
- Put Warrant

Call warrants give the right to buy a security and Put warrants give the right to sell the security.

### Features of Warrants

Warrants are like options but have few differences. These differences are as follow:

- Generally issued by the company and not by the third party;
- Mostly traded over the counter;
- Investors do not have the right to write warrants;
- Dilutive in nature;
- When the investors exercise warrants, new stocks are issued instead of the outstanding stocks;
- Have a longer period between issue and the expiry;
- Do not have voting rights;
- Do not pay dividends.

There are different kinds of warrants. These are:

- Traditional warrants
- Wedded warrants
- Covered warrants

**Traditional warrants:** These are usually issued along with the bonds and are known as warrant linked bonds. Such warrants are detachable in nature which means that they can be separated from the bonds.

**Wedded warrants:** These are non-detachable warrants and the bonds/stocks wedded (attached) has to be surrendered for exercising the warrants.

**Covered warrants:** These are issued by the financial institutions. These are covered in the sense that institution which issues the warrants already owns the underlying shares.

It is to be noted here that it is quite difficult to trade the warrants as they are not listed on the stock exchange and the data related to it is not freely available. In case they are listed, it is difficult to find them as ‘W’ is attached to the name of the stock. For e.g. Suppose the stock of the company X is listed as ABC. The symbol of the warrant of company X will be ABCW.

Warrants are usually traded at a premium which will reduce as the expiry date approaches.

Warrants are highly risky but do fetch high returns but they have to be exercised before the date of expiry.

## 3.4 SHORT-TERM SOURCES OF FINANCE

We know that this type of finance is used to finance the temporary working capital. Let us discuss few of the sources.

### 1) Trade Credit

This is a kind of arrangement whereby the suppliers of raw materials, components, finished goods etc. allow the customers to pay the outstanding balances within a specified credit period. Usually this period ranges between 3 to 6 months. The trade credit is given to the firms based on their nature and size credit worthiness, policy of trade credit etc. There are certain advantages and disadvantages associated with the trade credit. These are shown in table 3.4.

**Table 3.4 : Advantages and Disadvantages of Trade Credit**

Sl. No.	Advantages	Disadvantages
1.	Readily available	Costs may increase
2.	Flexible source of finance	Payments of bill of exchange or promissory notes to be made necessarily on maturity even if there is bad debt.
3.	Time of payment is adjustable	Possible loss of opportunity cost of discount on early payment
4.	No floatation costs	

### 2) Discounting Bills of Exchange

Bills of exchange are generally drawn by the suppliers when they sell the goods to the customers who accept it. The time period of these bills ranges from 3-6 months. Usually the firms prefer to get such bills discounted than holding it till maturity.

Discounting bills of exchange is an act of selling the bill to get the payment before the maturity. The bank charges discount in terms of interest for the period from the date of discounting to the date of the maturity of the bills. When the maturity is attained then the bank presents the bills to the acceptor to get full payment and in case bank does not receive the bill then it is known as dishonour of the bill. The cost associated with this type of source is the discount charged by the bank.

### 3) Bank Overdraft

It is a kind of arrangement whereby the bank allows the customer to withdraw money over and above the deposited amount from current account but within a specified limit. This facility is given against a

security of assets or personal security. The bank charges the interest only on the actual amount overdrawn. In this case also the cost is the interest charged by the bank.

**4) Cash Credit**

It is a facility provided by the bank to the borrower to draw money from time to time within a specified limit and this limit is known as cash credit limit. This facility is also granted against a security. It can be a pledge or hypothecation of stock etc. In this case also the cost is the discount charged by the bank only on the actual amount withdrawn for actual period of use.

**5) Public deposits**

These are the funds which are raised by the companies by inviting their shareholders, employees and public at large to deposit their savings with the company. It is important to note that the general public cannot deposit savings in the private company. These funds are raised by the companies to meet their short and medium term financing need. The minimum period for the deposit of fund is 6 months and maximum is 3 years. This type of funds do not have any security attached with them and can be easily invited by offering higher rate of interest than the banks.

**6) Advances from customers**

This is the payment the firm has received from customers for the goods and services not yet delivered.

**7) Pre shipment finance**

It is before the shipment of goods. It is the credit which is extended to the exporter for purchase, processing, and manufacturing of goods before the shipments of goods. It can be granted in the form of loan, cash credit or overdraft facilities.

**8) Post shipment finance**

It is after the shipment of goods. It is the credit granted to the exporter after the shipment of goods. This is granted to meet the working capital requirements and insurance of goods. It can be received from banks, EXIM bank and non-banking financial companies.

**9) Inter corporate deposit**

The business firms can borrow funds from other firms which have good liquidity. It can also be borrowed for a single day. The rate of interest on inter-corporate deposits depends upon the amount and the time for which it is taken.

These are some of the major types of short term sources of finance. Apart from this following are the other sources of short term financing:

- Clean overdraft
- Letter of Credit
- Bills Finance

- Working Capital demand loan
- Factoring
- Commercial paper
- Advanced against goods
- Advances against documents of title of goods
- Advances against supply of bills
- Financing export trade by banks
- Certificate of Deposits

All the sources of financing depend largely on the needs of the customers.

#### **Check Your Progress C**

- 1) What is venture capital?

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- 2) List the different types of debentures.

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- 3) Explain trade credit.

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### **3.5 LET US SUM UP**

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There are different sources of financing. Their classification of financing is based on the following three parameters: a) Time, b) Ownership and Control, and c) Source of Generation

The three different types of sources of financing are:

- Long - term sources of finance: These are equity shares, preference shares, debentures, venture capital, lease financing and warrants.
- Medium - term sources of finance
- Short - term sources of finance: The major short term sources of finance are trade credit, bank overdraft, factoring, commercial paper, cash credit, and public deposits etc.

The financing needs of the organizations vary as per their prevailing situation. Therefore, we cannot generalise the fact that any one source of

financing is good or bad for the organization. Overall the financing ways differ from organization to organization.

### 3.6 KEY WORDS

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**Long-term financing :** It is the capital requirement for a period more than 5 years.

**Medium-term financing :** It is the requirement which is available for a period which exceeds 1 year but not exceeding 5 years.

**Short-term financing :** It is the capital requirement to fund temporary working capital which is available for 1 year.

**Equity :** It is the ownership fund of the company and is permanent to the capital structure.

**Preference Share :** It carries a right to dividend and a right to receive payment capital.

**Debenture :** It is a debt instrument which contains provisions with regards to the payment of principal and payment of interest at a fixed rate.

**Venture Capital Financing :** It is the financing of new and risky ventures having high potential.

**Trade Credit :** It is an arrangement by the supplied to their customers to pay their outstanding balances within the credit period allowed to them.

**Overdraft :** A facility provided by the banks which allows the customers to withdraw money over and above the deposited amount within a specified period of time.

**Cash Credit :** A facility provided by banks which allows the borrower to withdraw money from time to time but within specified limit.

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### 3.7 SELF ASSESSMENT QUESTIONS

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- 1) Explain long-term sources of finance?
- 2) What is short-term source of financing? Explain a few short term sources of finance.
- 3) Explain the bases on which the sources of finance can be classified.
- 4) How is venture capital financing done? Explain.
- 5) Why is trade credit important?
- 6) What is lease financing? What are its advantages and disadvantages?

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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## **UNIT 4 RISK AND RETURN**

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### **Structure**

- 4.0 Objectives
- 4.1 Introduction
- 4.2 Concept of Risk
- 4.3 Types of Risk
  - 4.3.1 Classification of Systematic Risk
  - 4.3.2 Classification of Unsystematic Risk
- 4.4 Measurement of Risk
  - 4.4.1 Behavioural Measures of Risk
  - 4.4.2 Statistical Measures of Risk
- 4.5 Concept of Return
- 4.6 Types of Return
  - 4.6.1 Ex-ante Return
  - 4.6.2 Ex-Post Return
- 4.7 Risk – Return Trade-off
- 4.8 Let Us Sum Up
- 4.9 Key Words
- 4.10 Self-Assessment Questions

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### **4.0 OBJECTIVES**

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After studying this unit, you should be able to :

- explain the concept of risk and return;
- classify different types of risk;
- discuss various techniques to measure risk; and
- understand the concept of risk and return trade-off.

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### **4.1 INTRODUCTION**

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Risk and return form a major part of any financial decision making. The decisions can be made, considering both positive and negative aspects. In this unit, we are going to discuss different aspects of risk as it is very important for any financial manager to assess the risk and return and then make appropriate decisions. As we know that risk is the measure of uncertainty and there are certain elements or variables which come between the expected returns and the actual returns. In this unit, we will understand the concept of risk and return, their types, the measurement techniques and finally see the relationship between risks and return using different models.

## 4.2 CONCEPT OF RISK

Risk and Return

Suppose you have invested say ₹10,000 in shares with an expectation to get some return. We know that future is uncertain so the returns may vary. It is this uncertainty which is associated with risk. Therefore, we can say that risk is the measure of uncertainty and there is a difference between the expected return and the realized return. Therefore, we can define risk as the variability of actual return from the expected returns for a given asset/investment. The larger the variability, higher is the risk and vice-versa.

There are various components associated with risk. These are:

- Certainty
- Uncertainty
- Risk

**Certainty:** This is a situation where the expected return becomes the realized return and the possibility of deviation is nil. It usually happens in the monopoly type of market where the seller is certain that a certain amount of quantity of product will be sold.

**Uncertainty:** This is a situation where prediction cannot be made. The surety for occurrence of events is not there. This situation is complex and dangerous. In reality also, it is very difficult to adapt to the uncertain situations.

**Risk:** This is a situation which falls between certainty and uncertainty. The more certain is the situation lower is the risk, the more uncertain is the situation, higher is the risk. Therefore, we say that it is a situation where future results along with the associated probabilities are known. We can define risk as the variability of actual return from the expected returns for a given asset/investment. The larger the variability, higher is the risk and vice-versa.

## 4.3 TYPES OF RISK

We have learnt the concept of risk. Let us now see different types of risk and then we will learn how the risk can be measured in the subsequent section. Figure 4.1 shows the classification of risk.

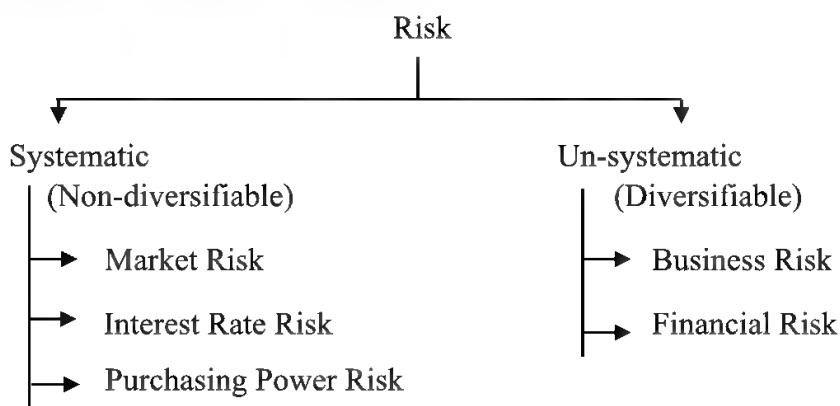


Figure 4.1 : Types of Risk

As shown in figure 4.1, there are two types of risks and they are:

1. Systematic risk
2. Unsystematic risk

These risks are discussed in a traditional sense. Let us try to understand these risks.

1) **Systematic Risk** :It refers to the share of total variability in return which is caused by factors affecting the prices of all securities. The sources of systematic risk are :

- uncontrollable
- external in nature
- broad

These factors can be economic, political, social etc. Since this type of risk cannot be controlled as it is dependent on external factors, therefore, it cannot be diversified either. That is why this risk is also known as undiversifiable risk. Let us understand this through an example. Suppose the economy is witnessing recession and corporate profits are moving downwards then the share listed on Bombay Stock Exchange (BSE) may decline broadly. This pattern is witnessed across all the stocks listed on BSE as the BSE index. It is said that around half of the total risk for an average common stock is systematic risk.

2) **Unsystematic Risk** :It refers to the share of risk which is unique to a firm or any industry. The sources of unsystematic risk are :

- controllable
- unique

The internal factors are the preferences of consumers, management capability etc., since these factors are independent of the factors which affect the securities of a market, this risk can be diversified. Therefore, this risk is also known as diversifiable risk.

#### 4.3.1 Classification of systematic risk

Systematic risk can be further divided into the following components :

- a) Market Risk
- b) Interest rate risk
- c) Purchasing Power risk
- a) **Market Risk:** This is one of the most important part of systematic risk. We know that the stock market is quite volatile. Stock prices fluctuate depending on the external forces. It is not uncommon to note that stock prices of a firm may fall but at the same time its earnings may increase and vice-versa. The stock prices may fluctuate within a short time period but the earnings do not vary. This happens mainly because of change in

expectations of the investors towards equities in general and other types of securities in particular. All this is because of the market risk.

Therefore, we can say that market risk is the result of the reaction of investors towards the prices and returns of the security.

What are the causes of market risk ?

The causes of market risk can be as follows;

- investors attitude
- investors expectations
- investors judgment

The basis of changes in investor's reaction is due to political, economical and social factors. The judgment of investors is based on set of certain events. These events may be tangible or intangible. The tangible events are real like political factors whereas intangible events are abstract in nature like psychology of the market. Though market risk is more affected by a set of real or tangible events but intangible events like emotional instability of investors also leads to the turn of events. Let us understand it in this way.

Suppose due to certain political or social turmoil, the stock prices start falling. In this case, the fear of loss grips the investors and investors may like to exit. This happens as a chain reaction and all the investors may like to leave. This reaction then leads to heavy selling which pushes the prices of the stock further down leading to the downfall of the stocks.

Apart from this the interest rate risk and inflation also affect the market risk. They are a larger part of impact of systematic or uncontrollable factors.

#### **b) Interest Rate Risk:**

Let us now discuss the other part of systematic risk. This is the risk which is caused by the fluctuations in the general interest rates and represents the understanding of future market values and future income. The causes of interest rate risk are as follows:

- rise and fall of rate of interest paid on government securities
- demand of rate of return on alternative sources like stocks, bonds etc.

It can be said that as the cost of risk free securities like government bonds changes, the cost of risk securities like shares of private players also changes.

What are the reasons for changes in the government securities?

The main reason for the changes in the cost of government securities is the supply and demand. Let us understand it through an example.

Suppose you are holding outstanding issues of government securities at a rate of say 8% which is fixed at the time of buying the securities. Now, due to certain changes the interest rate rises to 8.5%. The potential buyer

will compare the rates and will try to buy the new issues. You are already holding the old issues so you do not have a chance to demand higher price for your securities. The potential buyer will be attracted to the securities only if you "marked down" the price. So as the interest rate rises these securities become more lucrative. As a result the investors will buy the government securities which will impact the buying behaviour of the corporates. This will result in the rates of interest of corporate bonds to rise which will lead to fall in price.

Therefore, it can be said that lower or higher rates impact the attractiveness of the securities.

**c) Purchasing Power-Risk:**

We have learnt that market rate and interest rate risks are measured in times of uncertainties with respect to the amount of current rupee to be received by an investor. Purchasing power risk as the name suggests is the uncertainty with respect to the purchasing power of the amounts to be received. To simplify it we can say that it is the impact of inflation or deflation on any investment.

Let us now see what is inflation and deflation to understand the concept of purchasing power risk.

Inflation : It is the rising prices of goods and services.

Deflation : It is the falling prices of goods and services.

These two components form the purchasing power risk. Usually it is related more to inflation globally as the decline in price is quite less. Let us take an example to have further understanding.

Suppose,

Cost of living index in the beginning is 100

Cost of living index in the end of year is 105

Then rate of increase (inflation) is 5% ( $105-100/100 = 0.05 = 5\%$ ) and it may increase periodically. This will impact the purchasing power risk.

All the above three risks are the main source of systematic risk. Now let us understand the unsystematic risk.

#### **4.3.2 Classification of Unsystematic Risk**

It is a portion of total risk which is unique to a firm or industry. There are certain factors which cause the unsystematic risk. When we discuss this risk we need to consider two sources which give rise to the uncertainty associated with the payment on securities.

These are:

- a) operating environment of the business
- b) financing of the firm

The operating environment of the business leads to business risk and financing environment leads to the financial risk.

The types of unsystematic risk are:

Risk and Return

- a) **Business Risk** - It is the function of the operating conditions which a firm faces and the variability in the conditions influence the operating income and dividends.

Suppose operating earnings are presumed to increase by 10% annually in a foreseeable future, the business risk will be higher in case of operating earnings. This risk is as high as 15% or as less as 5%. This degree of variation from the expected returns will measure business risk.

Business risk can be classified further into two categories:

- Internal business risk
- External business risk

**Internal Business Risk** considers the internal operating environment of the organization and its efficiency. The operating efficiency determines the amount of business risk associated with the firm.

**External Business Risk** is associated with the operating conditions outside the firm which are uncontrollable on the part of the organization. Factors like budget also affect the business cycle. It is found that sales of industries like steel, automobile etc. tend to move with the business cycle but businesses like housing move opposite to the business cycle.

- b) **Financial Risk** - It is the risk which shows how firm procures finances for its activities. This can be assessed by seeing the capital structure of the firm. This type of risk can be avoided as decision making to borrow funds or not-to borrow funds lies with financial manager. When a firm has nil debt-financing then we say that no financial risk is associated with that firm.

So far we have studied different types of risks and how they impact the efficiency of the firm. Let us now see different techniques to measure risk.

### Check Your Progress A

- 1) What is risk?

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.....

- 2) What do you mean by systematic risk?

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.....  
.....

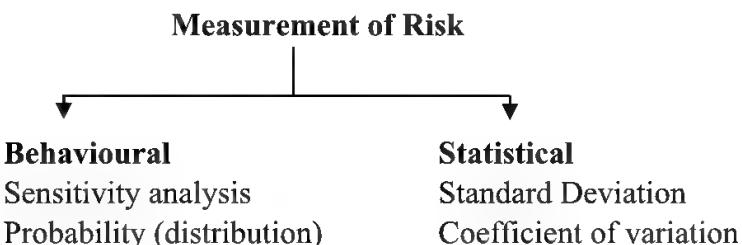
- 3) What are the types of unsystematic risk?

.....  
.....

## 4.4 MEASUREMENT OF RISK

We have learnt different types of risks and how they influence the efficiency of a firm. Let us now discuss different measures of risks.

Risk can be measured in behavioural as well as statistical terms. Figure 4.2 represents ways to measure risk:



**Figure 4.2 : Measurement of Risk**

### 4.4.1 Behavioural Measures of Risk

This uses two methods - Sensitivity analysis and Probability (distribution).

- a) **Sensitivity Analysis** - This considers the numbers of possible outcomes/returns while evaluating an asset.

There can be three possible outcomes related to the evaluation. These are;

- pessimistic
- most likely
- optimistic

The pessimistic outcome estimates the worst scenario; the most-likely outcome estimates the expected scenario; optimistic outcome estimates the best outcome. These three outcomes are related to recession, normal and boom conditions respectively. When we use sensitivity analysis, we use the range of optimistic to pessimistic outcome as the measure of risk. Let us see the illustration 1 in table 4.2.

#### Illustration 1

**Table 4.2: Sensitivity Analysis**

(Amount in ₹crores)

Particulars	Asset A	Asset B
Initial outlay ( $t=0$ )	100	100
Annual return (%)		
Pessimistic	10	6
Most Likely	12	12
Optimistic	14	18
Range (Optimistic-Pessimistic)	4	12

Assessing the structure of both the assets A and B, we can say that asset B is more risky.

**b) Probability (Distribution)** - This is a more accurate measure to assess the risk. It is the percentage chance of occurrence of any event.

e.g. Suppose the expectation of a given outcome is 6 out of 10 times, then we say that there is 60% chance of the occurrence of an event.

If there is a 100% chance of a particular event happening then the probability is zero. This situation is an ideal situation and in reality never occurs.

We can compute the expected rate of return using the following equation:

$$\bar{k} = \sum_{i=1}^n k_i \times Pr_i$$

Where;

$\bar{k}$  = expected return

$k_i$ =return for  $i^{\text{th}}$  possible outcome

$Pr_i$ = Probability associated with its return

n = number of outcome considered

- We will take the same example of asset A and B and try to calculate the expected rate of return. Table 4.3 depicts the same.

**Table 4.3 Expected Rates of Returns**

(Probability)

Probable Outcomes (1)	Probability (2)	Returns (%) (3)	Expected returns (2x3) = (4)
<b>Asset A</b>			
Pessimistic (recession)	0.20	10	2.0
Most Likely (normal)	0.60	12	7.2
Optimistic (boom)	0.20	14	2.8
	<b>1.00</b>		<b>12.00</b>
<b>Asset B</b>			
Pessimistic (recession)	0.20	6	1.2
Most Likely (normal)	0.60	12	7.2
Optimistic (boom)	0.20	18	3.6
	<b>1.00</b>		<b>12.00</b>

#### 4.4.2 Statistical Measures of Risk

Now let us discuss the statistical measures of risk.

There are two types of statistical measures. They are:

- a) Standard Deviation (SD)
- b) Coefficient of Variation (CV)

### 1) Standard Deviation (SD) of Returns

We know that risk is the dispersion of returns for an expected value. Standard deviation is one of the most common methods of measure risk of an asset statistically. It is represented as:

$$\sigma = \sqrt{\sum_{i=1}^n (k_i - \bar{k})^2 \times p_{ri}}$$

$\sigma$  = standard deviation

$k_i$  = return for the  $i^{\text{th}}$  possible outcome

$\bar{k}$  = most likely expected return

$p_{ri}$  = probability associated with its return

$n$  = number of outcomes considered

Table 4.4 presents the Standard deviation values for the same rate of returns as in illustration (1) for Assets A and B

#### Asset A

i	$k_i$ (%)	$\bar{k}$ (%)	$k_i - \bar{k}$ (%)	$(k_i - \bar{k})^2$ (%)	$p_{ri}$	$(k_i - \bar{k})^2 \times p_{ri}$
1	10	12	(-2)	4	0.20	0.80
2	12	12	0	0	0.60	0
3	14	12	2	4	0.20	0.80

$$\sigma_{kA} = \sqrt{\sum_{i=1}^3 (k_i - \bar{k})^2 \times p_{ri}} = \sqrt{1.6} = 1.26$$

#### Asset B.

Similarly, we can calculate for

I	$k_i$ (%)	(%)	$k_i - \bar{k}$ (%)	$(k_i - \bar{k})^2$ (%)	$P_{ri}$	$(k_i - \bar{k})^2 \times p_{ri}$
1	6	12	(-6)	36	0.20	7.2
2	12	12	0	0	0.60	0
3	18	12	6	36	0.20	7.2

$$\sigma_{kB} = \sqrt{\sum_{i=1}^3 (k_i - \bar{k})^2 \times p_{ri}} = \sqrt{14.4} = 3.79$$

We can decipher from the above illustration that greater is the SD, the greater is the risk of an asset or investment. In the above illustration we can say that Asset B is riskier than Asset A as it has higher SD. Therefore, we can say that SD is an absolute measure of dispersions which does not consider the variability of return with respect to the expected value.

Let us now discuss the other part of statistical measure which is coefficient of variation.

## 2) Co-efficient of Variation (CV)

It is said to be a measure of relative dispersion (risk) or risk per unit of expected return. It basically converts SD of the expected values to relative values. The equation for computing Co-efficient of variation is as follows:

$$CV = \sigma_k / k$$

In case of Asset A,

$$CV = (1.26\% / 12\%) = 0.105$$

Whereas for Asset B it is

$$CV = (3.79\% / 12\%) = 0.083$$

The higher the value of CV, higher is the risk.

### Check Your Progress B

List different measures of risk.

.....  
.....  
.....

## 4.5 CONCEPT OF RETURN

We have understood the concept of risk, let us now see as to what is a return. The word meaning of return means to get back something in lieu of some investment made. Return is usually called as rate of return as the time is associated with it. We can define return as the annual income received with change in market price for a given period of time. This is represented using the following formula:

$$R = \frac{D_t + (P_t - P_{t-1})}{P_{t-1}}$$

R = expected return

D<sub>t</sub> = annual income/cash dividend at the end of time period

t = time period

P<sub>t</sub> = share price at time period t (closing/ending share price)

We can understand the concept through an example :

Example: suppose the price of a share X is ₹50 on April 1, 2020 (current year), annual dividend received is ₹2 and the year-end price on March 31, 2021 is ₹55. What is the rate of return ?

Solution :

$$D_t = 2$$

$$P_t = 55$$

$$P_{t-1} = 50$$

Substituting the values in the equation we get :

$$\begin{aligned} R &= \frac{2 + (55 - 50)}{50} \\ &= \frac{7}{50} = 0.14 = 14\% \end{aligned}$$

This rate of return has two components viz.

- current yield
- capital gain/loss

### Current Yield

$$\text{Current Yield} = \frac{\text{annual income}}{\text{Opening price}}$$

In the above example, it will be

$$= \frac{2}{50} = 0.04 = 4\%$$

### Capital gain/loss

$$\text{Capital gain/loss} = \frac{\text{closing price} - \text{opening price}}{\text{opening price}}$$

If we substitute the values from the above example, we get :

$$\begin{aligned} \text{Capital gain/loss} &= \frac{55 - 50}{50} = \frac{5}{50} = \frac{1}{10} \\ &= 0.10 = 10\% \end{aligned}$$

Therefore,

$$R = 14\%$$

$$\text{Current yield} = 4\%$$

$$\text{Capital gain/loss} = 10\%$$

Returns can be realized or expected. Realized returns are the returns which have already been earned by the firm and therefore, they become historic in nature. Expected returns are the anticipated returns which are to be earned in future.

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## 4.6 TYPES OF RETURN

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Let us now learn different types of returns. We need to know that how can we predict returns of a security.

This can be done using different types of return. As discussed earlier that returns can be expected and realized. The returns of the security can be predicted using **Ex-ante return** and **Ex-Post return**.

#### 4.6.1 Ex-ante Return

It predicts a particular event in the future (before the event), for e.g. what are the expected future returns of the organization. It is usually inaccurate as it is very difficult to account for the variable that is affected by the market forces.

To express the Ex-ante return we use the following equation:

$$\text{Ex-ante return} = \frac{\text{anticipated dividend} + \text{anticipated end price}}{\text{Initial Investment}}$$

**Features of Ex-ante return:**

- It occurs before the event;
- It is the estimated return;
- Actual outcome is uncertain;
- Serves as the basis for comparison with actual results.

**Example: in case of mergers, analysts predict the expected synergies which will arise in future when the merger finally takes place.**

#### 4.6.2 Ex-Post Return

It looks at the events which have actually occurred (after the event). These are historical in nature and are usually used to forecast the probability of gain/loss for a specific investment.

It is expressed through the following equation:

$$\text{Ex-Post return} = \frac{\text{Actual dividend received} + \text{Actual market price}}{\text{Initial Investment}}$$

**Features of Ex-Post return:**

- It occurs ‘after the event’;
- It is used to forecast the expected returns;
- It represents the actual returns;
- It helps the investors to know the actual performance of the company.

A finance manager can analyze the difference between ex-ante and ex-post returns to assess the accuracy of the prediction which in turn will help in appropriate decision making.

### 4.7 RISK-RETURN TRADE-OFF

The more diversified is the portfolio i.e. selection of securities, the less is the risk. We select the portfolios using the statistical measures of risk. We know that;

Total Risk = Systematic Risk + Unsystematic Risk

Since, there is no perfect correlation between a combination of securities, a certain amount of risk is anyhow associated even with a well-diversified

portfolio. Since, the systematic risk is important for investors there is a trade-off between risk and return. There are two models which determine the relationship between risk and return. These are:

- 1) Capital Asset Pricing Model (CAPM)
- 2) Arbitrage pricing Theory

We will discuss both these Models.

### 1) Capital Asset Pricing Model (CAPM)

This model describes the relationship/trade-off between risk and return. It tries to explain the behaviour of the prices of security and helps the investors to assess the impact of a security investment on the overall portfolio risk. This model is based on certain assumptions. The assumptions are related to:

- i) Efficiency of the Market
- ii) Investor Preference

The assumptions are:

- a) The decision of investors is based only on the expected return and risk associated with the security;
- b) An individual investor cannot influence the price of the security in the market;
- c) Investors have an option of lending and borrowing funds at risk free rate of interest;
- d) Assets are divisible infinitely;
- e) No transaction costs associated with buying or selling of stocks;
- f) Investor is indifferent towards capital gain and dividend.

CAPM links systematic risk and return of all assets. Systematic risk is measured using Beta Coefficient ( $\beta$ ).

Beta Coefficient ( $\beta$ ) is the index of the degree of responsiveness of security return with that of market return. Beta is equal to 1 for a market portfolio as per the definition. Beta can be computed using the following equation:

$$k_j = a_j + \beta_j k_m + e_j$$

$k_j$  = expected rate of return

$a_j$  = intercept which is equal to risk free rate (Rf)

$e_j$  = random error reflecting the unsystematic rate of asset (j)

$k_m$  = required rate of return

$\beta_j$  = beta coefficient

$$\beta_j = \frac{C_{ov}(k_j, k_m)}{\sigma^2_m}$$

$C_{ov}$  = covariance of return on asset j,  $k_j$  and Market portfolio,  $k_m$

$$C_{ov} = \sum_{t=1}^z \frac{(k_{jt} - k_j)(k_{mt} + k_m)}{(n-1)}$$

$\sigma^2_m$  = variance of return of market portfolio.

Therefore: CAPM is represented by the following equation:

$$k_j = R_f + \beta_j \times (k_{mt} - R_f)$$

The larger is the beta, greater is the required return and vice versa if other things are equal.

## 2) Arbitrage Pricing Theory

It explains the nature of relationship between risk and return with less assumption than CAPM.

What is an arbitrage?

It is a process of earning profit by taking advantage of differential pricing of the same asset. In the security market, the securities are sold at a higher price in one market and then same of type of securities are purchased at a relatively lower price in another market. Hence the investors earn profit through arbitrage and the profit earned through arbitrage is risk free. So whenever an opportunity comes, the investors take the advantage of arbitrage. However, buying and selling of securities reduce and eliminate the margin of profit and market price of securities comes at the equilibrium level.

The assumptions related to this theory are:

- i) Investors have homogeneous expectations.
- ii) Investors are risk averse.
- iii) Market has perfect competition.
- iv) There are no transaction costs.

At first glance, CAPM and Arbitrage pricing theory look similar, but CAPM makes a restrictive assumption about transactional costs and private information.

APT relaxes these assumptions and allows for multiple sources of market risk and for assets to have different exposure (betas) to each source of market risk.

This theory is represented by the following equation.

$$E(R) = R_f + \sum \beta_i [E(R_i) - R_f]$$

OR

$$E(R) = R_f + \beta_1 \times RP_1 + \beta_2 \times RP_2 + \beta_3 \times RP_3 + \dots + \beta_n \times RP_n$$

Where-

$E(R)$  = Expected rate of return

$R_f$  = Risk free rate

$\beta$  = Sensitivity of asset

$RP$  = Risk premium

This theory has been specified by Stephen Ross who believes that the factors that capture risk of portfolio are inflation, industrial production, risk premium, and term structure of interest rates.

To summarize APT is a more flexible alternative to CAPM but is complex also. It is more difficult to apply as it takes long time to determine all those factors that may influence price of an asset.

## 4.8 LET US SUM UP

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Risk is of two types - systematic which is not diversifiable and unsystematic which is diversifiable in nature. Risk is the measure of uncertainty and higher the risk, higher is the return. The risk of a portfolio (a group of different securities) is measured in the same way as the risk of a single security. The risk can be measured in behavioural as well as statistical terms. Behavioural methods are sensitivity analysis and probability distribution. The statistical methods are standard deviation and coefficient of variation. There are two methods which determine the risk-return trade off. These are Capital Asset Pricing Model and the Arbitrage theory. These Models measure the systematic risk.

## 4.9 KEY WORDS

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**Risk** : Measure of uncertainty.

**Certainty** : Situation which reflects that event will occur without any deviation.

**Return** : Expected outcome from an event

**Systematic risk** : Risk based on external or uncontrollable factors

**Unsystematic risk:** Risk associated with the controllable factors.

## 4.10 SELF-ASSESSMENT QUESTIONS

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- 1) Explain the Concept of Risk.
- 2) Discuss the Concept of Return.
- 3) Explain the different techniques to measure risk?
- 4) What is capital asset pricing model and Arbitrage pricing theory? Differentiate between them.

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice on**

## **BLOCK 2**

## **INVESTMENT DECISIONS**

## **BLOCK 2 INVESTMENT DECISIONS**

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You know that one of the main functions of financial management is investment decisions. Investment decisions can be investment in short-term assets and investment in long-term assets. The main purpose is to carefully select the assets and invest the funds.

The investment can be for the expansion of the business, setting-up new business, for modernization of business etc. Such type of decisions involve large amount of funds in long-term assets and risk and uncertainty, hence they should be carefully planned and evaluated. How much to invest and in what type of long-term assets are the capital budgeting decisions.

This block relates to the capital budgeting decisions. It contains four units.

**Unit 5: Capital Budgeting – An Introduction.** This unit explains the meaning, significance and process of capital budgeting decisions. It also explains cash flow estimation and nature and types of capital budgeting decisions.

**Unit 6: Techniques of Capital Budgeting-I** – It discusses the pay-back period technique and accounting rate of return method.

**Unit 7: Techniques of Capital Budgeting-II** It discusses the other techniques like net present value, internal rate of return and capital rationing.

**Unit 8: Capital Budgeting under Risk and Uncertainty** – It explains risk analysis in capital budgeting, types of risk, conventional techniques, risk adjusted discount rate and certainty equivalent method.

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## **UNIT 5 CAPITAL BUDGETING - AN INTRODUCTION**

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### **Structure**

- 5.0 Objectives
  - 5.1 Introduction
  - 5.2 Features
  - 5.3 Significance
  - 5.4 Cost and Benefit
  - 5.5 Cash Flow Estimation
  - 5.6 Process of Capital Budgeting
  - 5.7 Nature and Types of Capital Budgeting Decisions
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  - 5.11 Self-Assessment Questions/Exercises
- 

### **5.0 OBJECTIVES**

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After studying this unit, you should be able to:

- explain features and significance of capital budgeting;
  - discuss cost and benefit in capital budgeting;
  - understand the procedure of cash flow estimation;
  - describe capital budgeting process; and
  - discuss nature and types of capital budgeting decisions;
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### **5.1 INTRODUCTION**

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In Unit-4, you have understood the concept of risk and return, types of risk, measures of risk and risk-return relationship. In the present unit, you will learn the meaning, features, significance, process and types of capital budgeting decisions. Moreover, you will also learn the cost and benefit related to capital budgeting and the procedure for cash flow estimation.

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### **5.2 FEATURES**

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The capital budgeting refers to the decision of efficiently investing the available long term funds by a firm in long term assets providing future benefits. It is a process of deciding whether or not to invest in a project of whose costs and benefits are spread-over several years. The capital budgeting

decisions require huge funds and have significant impact on long term profitability and growth of a firm. The features of capital budgeting is as follows:

- i) Relate to efficient investment of available long term funds in long term assets.
- ii) Subject to high degree of risk.
- iii) Require huge funds as they usually relate to acquisition, replacement, expansion or modernization of long term assets.
- iv) Have long term implications on the profitability and growth of a firm.

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### 5.3 SIGNIFICANCE

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The capital budgeting decisions are important as they are irreversible, require huge funds, involve high degree of risk and have long term implications. The following points clearly explain the significance or importance of capital budgeting decisions:

- i) **Irreversible Decisions:** The capital budgeting decisions are irreversible as it becomes difficult to reverse the decision once the funds are committed to long term assets without incurring significant loss. For instance, if you make a capital budgeting decision of investment in machinery having useful life of 5 years and after one year of your investment, you realize that this machinery is not best suited to your manufacturing requirements then you are left with no option other than disposing it off at significant loss.
- ii) **Require Huge Funds:** The capital budgeting decisions are important as they involve investment of huge funds in the long term assets. While making capital budgeting decisions, you usually face situation when you have limited available funds which once committed to an investment proposal are blocked for its useful life. Thus, it is highly important that you invest the available limited funds in proposal that gives you the best possible return on the funds committed over its useful life.
- iii) **Involve High Degree of Risk:** The capital budgeting decisions are subject to high degree of risk as they involve investment in long term assets whose benefit will accrue over a series of future years. Thus, you must make a proper forecast of cash flows associated with an investment proposal after incorporating the risk through suitable adjustment in the discount rate used for finding out the present value of such cash flows.
- iv) **Have Long- term Implications:** While making capital budgeting decisions, you invest funds at present and the benefits will accrue over a series of future years. Efficient capital budgeting decisions lead to maximization of shareholders wealth while poor capital budgeting decisions may even threaten the survival of the firm. Thus, the capital budgeting decisions have long term implications on profitability and growth prospects of a firm.

## 5.4 COST AND BENEFIT

You may come across with the following costs and benefits while making capital budgeting decision:

### Costs

- i) Purchase price of the new asset including installation cost and other incidental expenses to make it workable.
- ii) Opportunity cost of the scarce resources to be used for the new project.
- iii) Tax liability on gain on sale of an existing asset to be replaced by new asset.
- iv) Additional working capital requirement for the new project.
- v) Subsequent outflow required on new asset.

### Benefits

- i) Salvage value of an existing asset to be replaced by new asset.
- ii) Tax savings on loss on sale of existing asset.
- iii) Cash profits contributed by the new project over a series of future years during its useful life.
- iv) Salvage value of new asset.
- v) Release of working capital at the end of new project life.

The costs and benefits of capital budgeting decisions are calculated in terms of cash flows rather than accounting profit. The costs of capital budgeting decision are calculated in terms of cash outflows while its benefits are calculated in terms of cash inflows. The term cash inflow is a misnomer. It does not refer to increase in cash. It should be referred to as increase or inflow of working capital. The following points clearly explain the need for using cash flows rather than accounting profit for computing cost and benefit of capital budgeting decisions:

- i) The accounting profit is affected by changes in accounting policies related to depreciation, inventory valuation etc. while cash flows are the actual cash flows which are not affected by discretionary accounting policies.
- ii) The accounting profit is affected by many non cash items like depreciation, goodwill written off etc. while such non cash items do not affect cash flows.
- iii) The accounting profit is based on accrual concept which considers benefits/cost that have occurred whether received/paid or not while cash flows approach considers time value of money by recording only cost and benefits paid or received in cash.

### Check Your Progress A

**1) Fill in the blanks with appropriate word.**

- i) The capital budgeting refers to the decision of efficiently investing the available \_\_\_\_\_ funds by a firm in \_\_\_\_\_ assets providing benefits over a \_\_\_\_\_.
- ii) The capital budgeting decisions affect long term \_\_\_\_\_ and \_\_\_\_\_ prospects of the firm.
- iii) The capital budgeting decisions involve \_\_\_\_\_ degree of risk.
- iv) The cash flows are \_\_\_\_\_ by changes in accounting policies.
- v) The cash flows are \_\_\_\_\_ by non cash items.

**2) State whether the following statements are True or False.**

- i) The capital budgeting decisions have short term implications.
- ii) The capital budgeting decisions are reversible in nature.
- iii) The opportunity cost of scarce resources to be used for the new project is ignored while computing costs of capital budgeting decision.
- iv) The costs and benefits of capital budgeting decisions are calculated in terms of cash flows.
- v) The cash flows ignore time value of money.

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## 5.5 CASH FLOW ESTIMATION

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The cash flow estimation requires estimation of initial cash outflows, annual cash inflows and terminal cash inflows. It is important to note here that only after tax incremental cash flows are considered for making capital budgeting decisions. The existing overhead expenses and sunk costs which are independent of present capital budgeting decision are ignored while estimating cash flows.

The following points clearly explain the procedure for cash flow estimation:

- i) **Initial Cash Outflows:** You can estimate the initial cash outflows by using the following steps:
  - a) Find out cost of new asset
  - b) Add Installation and other incidental expenses
  - c) Subtract scrap value of old asset if any
  - d) Subtract tax savings or add tax liability on loss or profit on sale of old asset if any
  - e) Add opportunity cost if any
  - f) Add increase in working capital if any

- ii) **Annual Cash Inflows:** You can estimate the annual cash inflows by using the following formula:

$$\text{Annual Cash Inflows} = \text{Profits after Tax} + \text{Depreciation} + \text{Interest} (1 - \text{Tax Rate}) - \text{Capital Expenditure}$$

You can also estimate annual cash inflows using the following formula:

$$\text{Annual Cash Inflows} = \text{Sales} - \text{Variable Cost} - \text{Fixed Cost} - \text{Depreciation} - \text{Tax} + \text{Depreciation} - \text{Capital Expenditure}$$

Now, let us take an example to understand the computation of annual cash inflows using the above two formulas:

The following information is available from income statement of Gem Limited:

Net Sales Revenue ₹ 20 lakhs; Cost of Goods Sold ₹ 10 lakhs; General Expenses ₹ 2 lakhs; Depreciation ₹ 1.5 lakhs; Interest ₹ 1 lakh, Profit before Tax ₹ 5.5 lakhs, Tax @ 30% ₹ 1.95 lakhs; Profit after Tax ₹ 3.85 lakhs.

You can easily compute cash inflows as given below:

$$\text{Cash Inflows} = \text{Profits after Tax} + \text{Depreciation} + \text{Interest} (1 - \text{Tax Rate})$$

$$\text{Cash Inflows} = 3.85 + 1.5 + 1 (1 - .30) = ₹ 6.05 \text{ lakhs}$$

You can also compute cash inflows as given in the following table:

Net Sales Revenue	₹ 20 lakhs
Less Cost of Goods Sold	₹ 10 lakhs
Less General Expenses	₹ 2 lakhs
Less Depreciation	₹ 1.5 lakhs
Profit before Interest and Taxes	₹ 6.5 lakhs
Less Tax @ 30%	₹ 1.95 lakhs
Profit after tax but before interest	₹ 4.55 lakhs
Add Depreciation	₹ 1.5 lakhs
Cash Inflows	₹ 6.05 lakhs

- iii) **Terminal Cash Inflows:** You can estimate the terminal cash inflows by adding the working capital released and scrap value of the new asset to the annual cash inflows of the last year of its useful life. You can also note that tax savings on loss on sale of new asset is added to terminal cash inflows while tax liability on profit on sale of new asset is deducted from terminal cash inflows.

Now, let us look at the Illustration 1, 2, 3 and 4 to clearly understand the procedure of cash flow estimation:

**Illustration 1:** Rose Limited is considering investment in Machine X for which the following information is available:

Cost: ₹ 29 lakhs; Installation Expenses: ₹ 1 lakh; Useful Life: 5 Years; Estimated Scrap Value: ₹ 2 lakhs; Additional Working Capital Required ₹ 2

lakhs; Annual Production 2 lakh units which is increased by 20,000 units in each of the subsequent year, Selling Price (per unit) ₹ 17; Variable Cost per unit ₹ 11; Fixed Cost: ₹ 4 lakhs per annum; Tax Rate: 30%; Depreciation 20% on written down value (WDV) method. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

**Solution:** (i) You can compute the initial cash outflows by adding the cost of machine, installation expenses and additional working capital required. Thus, the initial cash outflows are ₹ 29 lakhs + ₹ 1 lakh + ₹ 2 lakhs = ₹ 32 lakhs.

(ii) You can find out annual cash inflows from Machine X as given in the following table:

Particulars	Year 1	Year 2	Year 3	Year 4	Year 5
Sales (in units)	2,00,000	2,20,000	2,40,000	2,60,000	2,80,000
Sales Price (per unit in ₹)	17	17	17	17	17
Sales (₹)	34,00,000	37,40,000	40,80,000	44,20,000	47,60,000
Less Variable Cost @ ₹ 11 per unit (₹)	22,00,000	24,20,000	26,40,000	28,60,000	30,80,000
Less Fixed Cost (₹)	4,00,000	4,00,000	4,00,000	4,00,000	4,00,000
Less Depreciation (₹)	6,00,000	4,80,000	3,84,000	3,07,200	2,45,760
Profit before Tax (₹)	2,00,000	4,40,000	6,56,000	8,52,800	10,34,240
Less Tax @ 30% (₹)	60,000	1,32,000	1,96,800	2,55,840	3,10,272
Profit after Tax (₹)	1,40,000	3,08,000	4,59,200	5,96,960	7,23,968
Add Depreciation (₹)	6,00,000	4,80,000	3,84,000	3,07,200	2,45,760
Annual Cash Inflows (₹)	7,40,000	7,88,000	8,43,200	9,04,160	9,69,728

You can compute the terminal cash inflows by adding annual cash inflows, scrap value realized, working capital released and tax savings on loss on sale of Machine X. Thus, terminal cash inflows are ₹ 9,69,728 + ₹ 2,00,000 + 2,00,000 + 0.30(₹ 7,83,040\*) = ₹ 16,04,640.

\* ₹ 7,83,040 is loss on sale of machine X obtained by deducting scrap value of ₹ 2,00,000 from its book value of ₹ 9,83,040.

**Illustration 2:** Surya Limited is considering investment in Machine X with the following details:

Initial Investment: ₹ 4,00,000; Useful Life: 5 Years; Estimated Scrap Value: Nil; Additional Working Capital Required ₹ 55,000; Tax Rate: 30%, Earnings before Depreciation and Tax: ₹ 2,00,000 p.a. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows assuming that the company charges depreciation using (A) Straight Line Method (SLM) (B) WDV Method @ 20% p.a.

**Solution: (A) When company charges depreciation using Straight line method (SLM):**

- You can compute the initial cash outflows by adding the initial investment to the additional working capital requirement for Machine X. Thus, the initial cash outflows are ₹ 4,00,000 + ₹ 55,000 = ₹ 4,55,000.
- You can find out annual cash inflows from Machine X as given in the following table:

Earnings before Depreciation and Tax	₹ 2,00,000
Less Depreciation (4,00,000-0)/5	₹ (80,000)
Earnings before Tax	₹ 1,20,000
Less Tax (1,20,000 × .30)	₹ (36,000)
Earnings after Tax	₹ 84,000
Add Depreciation	₹ 80,000
Annual Cash Inflows	₹ 1,64,000

You can compute the terminal cash inflows by adding annual cash inflows to the working capital released. Thus, terminal cash inflows are ₹ 1,64,000 + ₹ 55,000 = ₹ 2,19,000.

**B) When company charges depreciation using written Down Value (WDV) Method:**

- You can compute the initial cash outflows by adding the initial investment to the additional working capital requirement for Machine X. Thus, the initial cash outflows are ₹ 4,00,000 + ₹ 55,000 = ₹ 4,55,000.
- You can find out annual cash inflows from Machine X as given in the following table:

Year	EBDT (₹) (1)	Depreciation* (₹) (2)	PBT (₹) (3)=(1)-(2)	Tax (₹) (4)=(3)0.30	PAT (₹) (5)=(3)-(4)	Annual Cash Inflows (₹) (6)=(5)+(2)
1	2,00,000	80,000	1,20,000	36,000	84,000	1,64,000
2	2,00,000	64,000	1,36,000	40,800	95,200	1,59,200
3	2,00,000	51,200	1,48,800	44,640	1,04,160	1,55,360
4	2,00,000	40,960	1,59,040	47,712	1,11,328	1,52,288
5	2,00,000	32,768	1,67,232	50,170	1,17,062	1,49,830

You can compute the terminal cash inflows by adding annual cash inflows, working capital released and tax savings on loss on sale of Machine X. Thus, terminal cash inflows are ₹ 1,49,830 + ₹ 55,000 + 0.30(₹ 1,31,072\*) = ₹ 2,44,152.

\* ₹ 1,31,072 is the book value of Machine X at the end of its life. However, it does not have any scrap value and hence loss on scrap of Machine X is considered as ₹ 1,31,072.

**Illustration 3:** Marigold Limited is considering investment in Machine X which requires Original Investment of ₹ 8,50,000 and generates Earnings before Depreciation and Taxes (EBDT) during its eight years of life as given below:

Year	1	2	3	4	5	6	7	8
EBDT (₹)	1,20,000	1,50,000	1,10,000	1,20,000	1,45,000	1,60,000	1,65,000	1,25,000

The Machine X has a salvage value of ₹ 50,000 and is depreciated using SLM of Depreciation during useful life of 8 years. The company is subject to tax rate of 30%. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

**Solution:** (i) You can clearly see that initial cash outflows here is equal to the initial investment in Machine X i.e. ₹ 8,50,000.

(ii) You can find out annual cash inflows from Machine X as given in the following table:

Year	EBDT (₹) (1)	Depreciation* (₹) (2)	PBT (₹) (3)=(1)- (2)	Tax (₹) (4)=(3) × 0.30	PAT (₹) (5)=(3)- (4)	Annual Cash Inflows (₹) (6)=(5)+(2)
1	1,20,000	1,00,000	20,000	6,000	14,000	1,14,000
2	1,50,000	1,00,000	50,000	15,000	35,000	1,35,000
3	1,10,000	1,00,000	10,000	3,000	7,000	1,07,000
4	1,20,000	1,00,000	20,000	6,000	14,000	1,14,000
5	1,45,000	1,00,000	45,000	13,500	31,500	1,31,500
6	1,60,000	1,00,000	60,000	18,000	42,000	1,42,000
7	1,65,000	1,00,000	65,000	19,500	45,500	1,45,500
8	1,25,000	1,00,000	25,000	7,500	17,500	1,17,500

\*As the company uses SLM of Depreciation, you can compute annual depreciation of Machine X as given below:

$$\text{Annual Depreciation of Machine X} = (8,50,000 - 50,000)/8 = ₹ 1,00,000$$

You can calculate terminal cash inflows by adding salvage value of Machine X to the annual cash inflows of last year of its useful life. Thus, the terminal cash inflows here is ₹ 50,000 + ₹ 1,17,500 = ₹ 1,67,500.

**Illustration 4:** Glory Limited is considering investment in Machine Y for replacement of existing Machine X having a remaining life of 5 years, book value of ₹ 5,00,000 at present, salvage value nil. However, Machine X can be sold presently at ₹ 2,00,000. The Machine Y has useful life of 5 years, cost ₹ 10,00,000 and has nil salvage value. The purchase of Machine Y to replace Machine X will generate an annual cost savings of ₹ 5,00,000 per annum over its useful 5 years life. The company uses SLM of Depreciation and is subject to tax rate of 30%. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

**Solution:** (i) You can find out initial cash outflows from Machine Y as given in the following table:

Cost of Machine Y	₹ 10,00,000
Less Sales Proceeds of Machine X	₹ (2,00,000)
Less Tax Savings of Loss on sale of Machine X [(5,00,000-2,00,000) 0.30]	₹ ( 90,000)
Initial Cash Outflows (Incremental) from Machine Y	₹ 7,10,000

(ii) You can find out annual cash inflows from Machine Y as given in the following table:

Annual Incremental EBDT from Machine Y (same as annual cost savings)	₹ 5,00,000
Less Annual Incremental Depreciation of Machine Y (2,00,000-1,00,000)	₹ (1,00,000)
Annual Incremental PBT	₹ 4,00,000
Less Annual Incremental Tax	₹ (1,20,000)
Annual Incremental PAT	₹ 2,80,000
Add Annual Incremental Depreciation of Machine Y	₹ 1,00,000
Annual Cash Inflows (Incremental) from Machine Y	₹ 3,80,000

You can clearly see that terminal cash inflows here is equal to annual cash inflows (incremental) i.e. ₹ 3,80,000.

### Check Your Progress B

#### 1) Fill in the blanks with appropriate word.

- i) The existing overhead expenses independent of capital budgeting decision are \_\_\_\_\_ for estimating cash flows.
- ii) The existing sunk costs independent of capital budgeting decision are \_\_\_\_\_ for estimating cash flows.
- iii) The scrap value of old asset is \_\_\_\_\_ for computing initial cash outflows for replacement decision.
- iv) The tax liability on profit on sale of old asset is \_\_\_\_\_ for computing initial cash outflows for replacement decision.

- v) The additional working capital released is \_\_\_\_\_ for computing terminal cash inflows.
- vi) The scrap value of new asset realized is \_\_\_\_\_ for computing terminal cash inflows.
- vii) The tax liability on profit on sale of new asset is \_\_\_\_\_ for computing terminal cash inflows.

**2) State whether the following statements are True or False.**

- i) Only incremental cash flows before tax are considered for making capital budgeting decisions.
- ii) The additional working capital requirement for the new project is deducted for computing initial cash outflows.
- iii) The tax savings on loss on sale of old asset is deducted for computing initial cash outflows for replacement decision.
- iv) The depreciation is deducted from profits after tax for computing annual cash inflows.
- v) The after tax interest expense is deducted from profits after tax for estimating annual cash inflows.
- vi) The tax saving on loss on sale of new asset is added for computing terminal cash inflows.

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## 5.6 PROCESS OF CAPITAL BUDGETING

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The capital budgeting process requires you to take the various steps such as investment proposals identification, preliminary screening, evaluation, prioritizing, final approval, implementation and review as explained below:

- i) **Identification:** First of all you need to identify the investment proposals taking into consideration the various changes taking place in business environment. For instance, you may require to replace an existing machine with a modern machine which is technically better and cost efficient.
- ii) **Preliminary Screening:** After identification of investment proposals, you need to do the preliminary screening of these proposals to find out their feasibility taking into consideration the resource requirements, risk return involved, technical feasibility and compatibility with the existing projects of the company.
- iii) **Evaluation:** You need to do the detailed evaluation of the investment proposals which successfully pass the preliminary screening stage. The detailed evaluation requires their market, demand, technical and financial analysis. The cash flows are found and the investment proposals are appraised using the various capital budgeting techniques.
- iv) **Prioritizing:** After evaluation of investment proposals, you need to prioritize the acceptable proposals depending on their urgency, funds required and expected returns.

- v) **Final Approval:** After prioritizing the investment proposals, you need to present the detailed report of acceptable investment proposals to the top management along with the funds requirement and sources of financing these proposals. The top management then approves the most desirable proposals consistent with wealth maximization of shareholders and allocates funds for such projects.
- vi) **Implementation:** The investment proposals approved by the top management are then implemented by raising funds, purchase of required assets, and deployment of assets so purchased, fixing of responsibilities for timely completion and determining the cost limits. You can use the network techniques for monitoring the implementation of investment proposals.
- vii) **Review:** After implementation of the projects, you need to review its performance by comparing the funds spent with the funds allocated and the actual returns with the anticipated returns. The purpose of project review is to find out unfavorable variances if any and taking timely corrective measures required for successful completion of the project.

## 5.7 NATURE AND TYPES OF CAPITAL BUDGETING DECISIONS

You have already understood that the capital budgeting decisions are irreversible in nature, require huge funds, involve high degree of risk, and have long term implications on the profitability and growth prospects of the firm. You can classify capital budgeting decisions on the basis of firm's existence or decision situation as explained below:

- 1) **Firm's Existence:** Both a new firm or an existing firm are required to take capital budgeting decisions as explained below:
  - i) **New Firm:** The capital budgeting decisions taken by new firm include selection, location and capacity utilization of plant.
  - ii) **Existing Firm:** The capital budgeting decisions taken by an existing firm include replacement, modernization, expansion and diversification as explained below:
    - a) **Replacement:** The decision to replace an asset at the expiry of its economic life for restoring or increasing the capacity is known as replacement decision. For instance, you may require replacing an existing machine at the end of its useful life with a new machine.
    - b) **Modernization:** The decision to replace an asset due to technological obsolescence for increasing operating efficiency and reducing cost is known as modernization decision. For instance, you may require to replace an existing machine before the end of its useful life with a new machine with better technology.

- c) **Expansion:** The decision to increase installed production capacity for increasing revenue and market share is known as expansion decision. For instance, you may require operating at a higher installed capacity for expanding your operations from domestic to international level.
  - d) **Diversification:** The decision to enter into new markets or starting new product lines for increasing revenue and market share is known as diversification decision. For instance, most of the commercial banks have diversified into the areas of insurance, mutual funds etc. to increase their revenue and market share.
- 2) **Decision Situation:** A firm may require to take capital budgeting decisions in various decision situation as explained below:
- i) **Accept-Reject Decision:** A firm may face accept-reject decision while deciding on a project which is independent of other projects. In accept-reject decision situation, you can accept all the projects that satisfy the minimum investment criterion.
  - ii) **Mutually Exclusive Projects:** Two or more projects are said to be mutually exclusive if the acceptance of any one project automatically implies rejection of all other projects as the projects are competitive in nature. Among mutually exclusive projects, you can accept a project that best satisfies the minimum investment criterion.
  - iii) **Complementary Projects:** Two or more projects are said to be complementary if the acceptance of any one project automatically implies acceptance of all other projects. Among complementary projects, you must simultaneously consider and evaluate all the projects as they have to be accepted in totality. For instance, introduction of online teaching require installation of information technology enabled infrastructure for teachers and students, training of teachers, development of online user friendly study material etc.

### Check Your Progress C

- 1) Fill in the blanks with appropriate word.
- i) The \_\_\_\_\_ stage of capital budgeting process relates to finding out the various available investment proposals.
  - ii) The investment proposals which successfully pass the preliminary screening stage are put to \_\_\_\_\_ stage of capital budgeting process.
  - iii) The investment proposals are prioritized depending on their \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.
  - iv) The funds are allocated to investment proposal at \_\_\_\_\_ stage of capital budgeting process.
  - v) The decision to replace an asset at the expiry of its economic life is known as \_\_\_\_\_ decision.

- vi) The decision to replace an asset due to technological obsolescence is known as \_\_\_\_\_ decision.
- vii) The decision to increase installed production capacity for increasing revenue is known as \_\_\_\_\_ decision.
- viii) The mutually exclusive projects are \_\_\_\_\_ in nature.

**2) State whether the following statements are True or False.**

- i) The preliminary screening of investment proposals is done after identification stage of capital budgeting process.
- ii) The investment proposals which successfully pass the evaluation stage are put to final approval stage of capital budgeting process.
- iii) The capital budgeting process ends at implementation stage of investment proposal.
- iv) The implementation stage of capital budgeting process relates to finding out unfavorable variances and taking corrective steps.
- v) The capital budgeting decisions taken by new firm include replacement, modernization, expansion and diversification.
- vi) The decision to start new product lines for increasing revenue is known as diversification decision.
- vii) The Accept-reject decision situation relates to independent projects.
- viii) The contingent projects are independent in nature.

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## 5.8 LET US SUM UP

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The capital budgeting refers to the decision of efficiently investing the available long term funds by a firm in long term assets providing future benefits. The capital budgeting decisions are important as they are irreversible, require huge fund, involve high degree of risk and have long term implications.

The costs and benefits of capital budgeting decisions are calculated in terms of cash flows rather than accounting profit. The costs of capital budgeting decision are calculated in terms of cash outflows while its benefits are calculated in terms of cash inflows. The cash flow estimation requires estimation of initial cash outflows, annual cash inflows and terminal cash inflows. The capital budgeting process requires you to take the various steps such as investment proposals identification, preliminary screening, evaluation, prioritizing, final approval, implementation and review.

You can classify capital budgeting decisions on the basis of firm's existence or decision situation. A new firm has to take capital budgeting decisions relating to selection, location and capacity utilization of plant while an existing firm has to take capital budgeting decisions such as replacement, modernization, expansion and diversification. Moreover, a firm may face different capital budgeting decision situations such as accept-reject decision, mutually exclusive projects and contingent projects.

## 5.9 KEY WORDS

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**Capital Budgeting:** Decision of efficiently investing the available long term funds in long term assets providing benefits over a series of future years.

**Cash Flows:** Used for finding costs and benefits related to capital budgeting decisions.

**Initial Cash Outflows:** Computed by adding cost of new asset, installation and other incidental expenses, opportunity cost, increase in working capital and tax liability on profit on sale of old asset and deducting scrap value of old asset and tax savings on loss on sale of old asset.

**Annual Cash Inflows:** Computed by adding profits after tax, depreciation, after tax interest expense on long term funds and deducting capital expenditure.

**Terminal Cash Inflows:** Computed by adding annual cash inflows, additional working capital released, scrap value of new asset realized, tax savings on loss on sale of new asset and deducting tax liability on profit on sale of new asset.

## 5.10 ANSWERS TO CHECK YOUR PROGRESS

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- A) 1 (i) long term, long term, series of future years (ii) profitability, growth (iii) high (iv) not affected (v) not affected
  - 2 (i) False (ii) False (iii) False (iv) True (v) False
- B) 1 (i) ignored (ii) ignored (iii) deducted (iv) added (v) added (vi) added (vii) deducted
  - 2 (i) False (ii) False (iii) True (iv) False (v) False (vi) True
- C) 1 (i) identification (ii) evaluation (iii) urgency, funds required, expected return (iv) final approval (v) replacement (vi) modernization (vii) expansion (viii) competitive
  - 2 (i) True (ii) False (iii) False (iv) False (v) False (vi) True (vii) True (viii) False

## 5.11 SELF-ASSESSMENT QUESTIONS/EXERCISES

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### Questions:

- 1) What is meant by capital budgeting? State the salient features of capital budgeting.
- 2) Why capital budgeting is considered significant?
- 3) Discuss the various costs and benefits related to capital budgeting.
- 4) Why cash flow approach instead of accounting profit is used for capital budgeting?

- 5) Discuss the procedure for cash flow estimation with suitable examples.
- 6) Explain the various steps involved in capital budgeting process.
- 7) Discuss nature and types of capital budgeting decisions.

**Exercises:**

- 1) Raj Limited is considering investment in Machine X for which the following information is available:

Cost: ₹ 60 lakhs; Useful Life: 5 Years; Estimated Scrap Value: ₹ Nil; Additional Working Capital Required ₹ 2 lakhs; Annual Production 2 lakh units, Selling Price (per unit) ₹ 32; Variable Cost (per unit) ₹ 20; Fixed Cost: ₹ 8 lakhs per annum; Tax Rate: 30%; Depreciation: SLM. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

[(i) Initial Cash Outflows ₹ 62 lakhs (ii) Annual Cash Inflows ₹ 14.80 lakhs; Terminal Cash Inflows ₹ 16.80 lakhs]

- 2) Riya Limited is considering investment in Machine X with following details:

Cost of Machine X: ₹ 7,50,000; Installation Cost: ₹ 50,000; Useful Life: 5 Years; Estimated Scrap Value: Nil; Additional Working Capital Required ₹ 1,55,000; Tax Rate: 30%, Earnings before Depreciation and Tax: ₹ 4,00,000 p.a. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows assuming that the company charges depreciation using (A) SLM (B) WDV Method @ 20% p.a.

[A (i) Initial Cash Outflows ₹ 9,55,000 (ii) Annual Cash Inflows ₹ 3,28,000; Terminal Cash Inflows ₹ 4,83,000; B (i) Initial Cash Outflows ₹ 9,55,000 (ii) Annual Cash Inflows Year 1: ₹ 3,28,000; Year 2: ₹ 3,18,400; Year 3: ₹ 3,10,720; Year 4: ₹ 3,04,576; Terminal Cash Inflows (Year 5) ₹ 5,33,304]

- 3) Silver Clouds Limited is considering investment in Project Y which requires Original Investment of ₹ 10,50,000. The project has an additional working capital requirement of ₹ 1,25,000 and generates Earnings before Depreciation and Taxes (EBDT) during its five years of life as given below:

Year	1	2	3	4	5
<b>EBDT (₹)</b>	4,25,000	5,55,000	4,40,000	5,50,000	4,05,000

The Project Y has a salvage value of ₹ 50,000 and is depreciated using SLM over its 5 years life. The company is subject to tax rate of 30%. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

[(i) Initial Cash Outflows ₹ 11,75,000 (ii) Annual Cash Inflows Year 1: ₹ 3,57,500; Year 2: ₹ 3,78,500; Year 3: ₹ 3,68,000; Year 4: ₹ 4,45,000; Terminal Cash Inflows (Year 5) ₹ 5,18,500]

- 4) Shuttles Limited is considering investment in Machine Y for replacement of existing Machine X. Machine X has a remaining life of 4 years, book

value of ₹ 2,00,000 at present, salvage value of nil. However, Machine X can be sold presently at ₹ 3,00,000. Machine Y cost ₹ 12,00,000 and has a salvage value of ₹ 2,00,000 at the end of its 4 years life. The purchase of Machine Y to replace Machine X will generate an annual cost savings of ₹ 4,00,000 per annum over next 4 years. The company charges depreciation by SLM and is subject to tax rate of 30%. Calculate (i) Initial Cash Outflows (ii) Annual and Terminal Cash Inflows.

[**(i) Initial Cash Outflows ₹ 9,30,000 (ii) Annual Cash Inflows ₹ 3,40,000; Terminal Cash Inflows ₹ 5,40,000]**

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 6 TECHNIQUES OF CAPITAL BUDGETING-I**

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### **Structure**

- 6.0 Objectives
- 6.1 Introduction
- 6.2 Payback Period
- 6.3 Computation of Payback Period
  - 6.3.1 Constant Annual Cash Inflows
  - 6.3.2 Unequal Annual Cash Inflows
- 6.4 Merits and Demerits of Payback Period Method
- 6.5 Accounting Rate of Return
- 6.6 Computation of Accounting Rate of Return
- 6.7 Merits and Demerits of Accounting Rate of Return Method
- 6.8 Let Us Sum Up
- 6.9 Key Words
- 6.10 Answers to Check Your Progress
- 6.11 Terminal Questions/Exercises

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### **6.0 OBJECTIVES**

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After studying this unit, you should be able to:

- explain and compute the payback period;
- discuss the merits and demerits of payback period method;
- explain and compute the accounting rate of return; and
- discuss the merits and demerits of accounting rate of return method.

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### **6.1 INTRODUCTION**

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In Unit-5, you have learnt the capital budgeting with emphasis on its features, significance, cost and benefit, cash flow estimation, and process. You have also learnt the nature and types of capital budgeting decisions. In this unit, you will learn the Payback Period Method and the Accounting Rate of Return Method which are traditional or non-discounting cash flows methods used for making capital budgeting decisions.

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### **6.2 PAY BACK PERIOD**

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The Pay Back Period (PBP) refers to the time period in which you can recover the amount originally invested in a project. The PBP can also be

described as the ‘Project Break Even Period’ as it provides you the number of years in which the project initial cash outflow become equal to its cumulative cash inflows.

**The following is the acceptance criteria of Pay Back Period Method:**

While making capital budgeting decisions, you must accept a project with a shorter PBP as compared to some predetermined PBP. If you want to choose among mutually exclusive projects then you must accept the one having shortest PBP among the projects having PBP shorter than the predetermined PBP.

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## **6.3 COMPUTATION OF PAYBACK PERIOD**

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While computing the Pay Back Period you may have the projects having either constant annual cash inflows or unequal annual cash inflows. The computation of PBP in both the situations is explained below:

### **6.3.1 Constant Annual Cash Inflows**

When the annual cash inflows of an investment project are constant (equal), you can compute the PBP by dividing the original amount invested in the project by the amount of constant annual cash inflows generated by the project as given below:

$$\text{PBP} = \text{Original Amount Invested} / \text{Constant Annual Cash Inflows}$$

Now, let us take an example to understand the computation and usage of PBP in such a case:

If a project requires original investment of ₹ 10,00,000 and provides annual cash inflows of ₹ 2,50,000 during its useful life of seven years; the PBP of the project is 4 years ( $10,00,000 / 2,50,000$ ) which means that the original investment of ₹ 10,00,000 in the project is fully recouped in 4 years.

If predetermined PBP is 6 years, you can accept the above project as it has the PBP of 4 years which is less than predetermined PBP of 6 years.

### **6.3.2 Unequal Annual Cash Inflows**

When the annual cash inflows of an investment project are unequal, you can compute the PBP by finding out time period in which its cumulative cash inflows are equal to amount originally invested.

**Pay Back Period = Time period in which the cumulative cash flows are equal to initial cash flows**

Now, let us take an example to understand the computation and usage of PBP in such a case:

If a project with an initial investment of ₹ 10,00,000 with a useful life of 6 years generates cash inflows and cumulative cash inflows as given below:

Year	1	2	3	4	5	6
<b>Cash Inflows (₹)</b>	2,00,000	1,00,000	4,00,000	3,00,000	3,00,000	4,00,000
<b>Cumulative Cash Inflows (₹)</b>	2,00,000	3,00,000	7,00,000	10,00,000	13,00,000	17,00,000

You can compute the PBP by finding the number of years in which the project generates the cumulative cash inflows equal to the initial investment of ₹ 10,00,000. You can easily see from the above table that the cumulative cash inflows after 4 years is ₹ 10,00,000 which is equal to the initial investment of ₹ 10,00,000. Hence, the PBP is 4 years.

If predetermined PBP is 3 years, you can reject the above project as it has the PBP of 4 years which is more than predetermined PBP of 3 years.

## 6.4 MERITS AND DEMERITS OF PAYBACK PERIOD METHOD

The following are the merits of PBP method:

- i) It is easy to understand and use. It is also used for the computation of Internal Rate of Return which is explained in Unit-7.
- ii) It uses the cash flows rather than the accounting profit of a project.
- iii) It is good for the firms facing liquidity problems as it focuses on the early recovery of the amount originally invested.
- iv) It takes into account the riskiness associated with projects having longer Payback Period as it prefers the projects with shorter Payback Period.

The PBP method suffers from the following demerits:

- i) It does not take into account the cash flows associated with a project after the PBP. The following example makes this limitation more clear:

If you have the choice among two mutually exclusive projects X and Y, each requiring original investment of ₹ 1,00,000 with constant annual cash flows after tax (CFAT) of ₹ 25,000 for 6 years of Project X and ₹ 20,000 for 10 years of Project Y; you can decide to invest in Project X which has a lower PBP of 4 ( $1,00,000/25,000$ ) years as compared to Project Y which has a PBP of 5 ( $1,00,000/20,000$ ) years. However, deciding Project X for investment over Project Y, you might not have made an appropriate decision as you have completely ignored the additional CFAT accruing in case of Project Y in later years.

- ii) It does not take into account the time value of money as it considers the cash flows till the PBP only and ignores the timing of the cash flows. The following example makes this limitation more clear:

Nippon Ltd. is planning to invest in project X or Y which are mutually exclusive, each requiring an original investment of ₹ 1,20,000. The following are their CFAT and cumulative CFAT during their useful life:

Year	1	2	3	4	5
<b>CFAT of Project X (₹)</b>	20,000	40,000	60,000	20,000	10,000
<b>CFAT of Project Y (₹)</b>	55,000	50,000	15,000	20,000	10,000
<b>Cumulative CFAT of Project X (₹)</b>	20,000	60,000	1,20,000	1,40,000	1,50,000
<b>Cumulative CFAT of Project Y (₹)</b>	55,000	1,05,000	1,20,000	1,40,000	1,50,000

You can easily see from the above table that the PBP of each of Project X and Y are 3 Years as the Cumulative CFAT are equal to the original investment of ₹ 1,20,000 for each of Project X and Project Y after 3 Years. Thus, you may be indifferent among these projects and may decide to invest in any of the Project X or Y. However, when you look at the timing of the CFAT, you can clearly observe that Project Y is better than Project X because it offers higher CFAT during initial years.

This limitation can be overcome using Discounted PBP which is equal to the time in years in which the project original cash outflow become equal to its cumulative discounted cash inflows. In the above example, using the cost of capital of 9 per cent the computation of Discounted PBP for Projects X and Project Y is given below:

Year	PV Factor at 9 %	Project X			Project Y		
		CFAT	Discounted CFAT	Cumulative Discounted CFAT	CFAT	Discounted CFAT	Cumulative Discounted CFAT
1	0.917	20,000	18,340	18,340	55,000	50,435	50,435
2	0.842	40,000	33,680	52,020	50,000	42,100	92,535
3	0.772	60,000	46,320	98,340	15,000	11,580	1,04,115
4	0.708	20,000	14,160	1,12,500	20,000	14,160	1,18,275
5	0.650	10,000	6,500	1,19,000	10,000	6,500	1,24,775

You can clearly see from the above table that the Project X is not able to recover its original investment of ₹ 1,20,000 over the period of its useful life of 5 years using Discounted CFAT and hence there is no point in selecting it. However, the Discounted PBP of Project Y is 4.265 years [4 years +  $(1,20,000 - 1,18,275) / (1,24,775 - 1,18,275)$ ]. Hence, you should select Project Y using the Discounted PBP although both Project X and Y have same Payback Period of 3 Year

- iii) It ignores the useful life and salvage value of the project.
- iv) It cannot be used for the projects requiring cash outflows in subsequent years.

Now, let us look at the Illustration 1, 2 and 3 to have clear understanding about the computation and use of Payback Period Method.

**Illustration 1:** Surya Limited is considering investment in Machine X, the following information is available:

Initial Investment: ₹ 4,00,000; Useful Life: 5 Years; Estimated Scrap Value: Nil; Tax Rate: 30%, Earnings before Depreciation and Tax: ₹ 2,00,000 p.a.

- Calculate the PBP of Machine X.
- Suggest the Surya Limited as to whether it should invest in Machine X if predetermined PBP of company is 3 years.

**Solution:** (i) First, find out the Cash Flows after Tax from Machine X as given in the following table:

Earnings before Depreciation and Tax	₹ 2,00,000
Less Depreciation (4,00,000-0)/5	₹ (80,000)
Earnings before Tax	₹ 1,20,000
Less Tax (1,20,000*.30)	₹ (36,000)
Earnings after Tax	₹ 84,000
Add Depreciation	₹ 80,000
CFAT	₹ 1,64,000

Now, you can find out the PBP by using the following formula:

$$\text{PBP} = \text{Initial Investment}/\text{Annual CFAT}$$

PBP=4,00,000/1,64,000=2.439 years. PBP can also be written as 2 years and 5.268 (0.439X12) months or 2 years 5 months and 8 (0.268X30) days.

(ii) After computing the PBP of Machine X, you can compare it with predetermined PBP of Surya Limited which clearly shows that the Surya Limited should invest in Machine X as the PBP of Machine X is 2.439 years which is less than predetermined PBP of 3 Years of Surya Limited.

**Illustration 2:** Prakash Limited is considering investment in Project X which requires Original Investment of ₹ 4,00,000 and generates CFAT during its eight years of life as given below:

Year	1	2	3	4	5	6	7	8
CFAT (₹)	60,000	76,000	50,000	44,000	72,000	80,000	80,000	56,000

- Calculate the PBP of Project X.
- Suggest the Prakash Limited as to whether it should invest in Project X if the company has predetermined PBP of 5 Years.

**Solution:** (i) First find out cumulative CFAT of Project X over the period of its useful life as given in the following table:

Year	CFAT (₹)	Cumulative CFAT
1	60,000	60,000
2	76,000	1,36,000
3	50,000	1,86,000
4	44,000	2,30,000
5	72,000	3,02,000
6	80,000	3,82,000
7	80,000	4,62,000
8	56,000	5,18,000

From the above table you can see that the Project X is able to generate cumulative CFAT of ₹ 3,82,000 after 6 years and ₹ 4,62,000 after 7 years on an original investment of ₹ 4,00,000. Hence, the PBP of Project X is in between 6 years and 7 years which you can calculate as given below:

$$PBP = 6 \text{ years} + (4,00,000 - 3,82,000) / (4,62,000 - 3,82,000) \text{ years} = 6.225 \text{ years}$$

(ii) After computing the PBP of Project X, you can compare it with predetermined PBP of Prakash Limited which clearly shows that the Prakash Limited should not invest in Project X as the PBP of Project X is 6.225 years that is more than predetermined PBP of 5 years of Prakash Limited.

**Illustration 3:** The project manager of Pearl Limited has calculated the Payback Period of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
Payback Period (in Years)	2.56	3.2	4.25	3.75	3.5

The maximum acceptable PBP of the company is 4 Years. The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

### Solution

- i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project PBP is less than the maximum acceptable PBP.

Comparing the PBP of each project with the maximum acceptable PBP of 4 years, you can find that Projects M (2.56<4), W (3.2<4), Y (3.75<4) and Z (3.5<4) have PBP less than the maximum acceptable PBP of 4 years. However, the Project X (4.25>4) has PBP more than the maximum acceptable PBP of 4 years. Thus, you can advise the company to invest in Projects M, W, Y and Z.

- ii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the shortest PBP among the projects having PBP less than the maximum acceptable PBP.

You have already observed that the Projects M, W, Y and Z have Payback Period less than the maximum acceptable Payback Period of 4 Years. Project M has the shortest Payback Period of 2.56 among these projects. Thus, you can advise the company to invest only in Project M.

### **Check Your Progress A**

**1) Fill in the blanks with appropriate word.**

- i) PBP refers to period in which you can \_\_\_\_\_ the amount originally invested in a project.
- ii) The PBP Method provides you the time period in which the project initial cash outflow becomes \_\_\_\_\_ to its cumulative cash inflows.
- iii) A project having \_\_\_\_\_ PBP as compared to some predetermined PBP Period is accepted while making capital budgeting decision.
- iv) PBP method considers the \_\_\_\_\_ instead of accounting profit from a project.
- v) PBP method is good for firms facing \_\_\_\_\_ problems.
- vi) PBP method \_\_\_\_\_ time value of money.
- vii) PBP method cannot be used for the projects requiring \_\_\_\_\_ in subsequent year

**2) State whether the following statements are True or False.**

- i) PBP method is a discounting cash flows method which is used for capital budgeting.
- ii) PBP is also known as the ‘Project Break Even Period’.
- iii) The project with shortest PBP is accepted among mutually exclusive projects.
- iv) PBP method is easy to understand and use.
- v) PBP method does not consider the riskiness associated with projects.
- vi) PBP method considers the entire cash flows associated with a project.
- vii) PBP method considers the useful life and salvage value of the project.
- viii) When the annual cash inflows from a project are constant with a fixed initial cash outflow, the PBP is computed by dividing the initial cash outflow by the constant annual cash inflows.
- ix) The Discounted PBP method considers the timing of the cash flows of an investment project.

## 6.5 ACCOUNTING RATE OF RETURN

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The accounting rate of return (ARR) is based on accounting profit instead of cash flows from an investment project and is used to measure profitability of investment project. The ARR is the annualized return you earn on funds invested in project.

**The following is the acceptance criteria of ARR Method:**

While taking capital budgeting decisions, you must accept a project having higher ARR as compared to some predetermined minimum acceptable rate. If you want to choose among mutually exclusive projects then you must accept the one having highest ARR among projects having ARR higher than predetermined minimum acceptable rate.

## 6.6 COMPUTATION OF ACCOUNTING RATE OF RETURN

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The ARR can be computed by expressing average annual Profit after Tax (PAT) as a percentage of average investment. Thus,  $\text{ARR} = (\text{Average Annual PAT}/\text{Average Investment}) \times 100$

You can compute the Average Annual PAT as given below:

**Average Annual PAT = Total Annual PAT of Project/Number of Years of Useful Life of Project**

It is important to note here that the Annual PAT are annual profit after charging depreciation and taxes but before charging interest on long term debt during the useful life of project. The above formula to compute average annual PAT is used if project generates unequal annual PAT during its useful life. If the project generates constant annual PAT during its useful life, then you can take the annual PAT as average annual PAT.

You can compute the average investment as given below:

**Average Investment =  $\frac{1}{2} (\text{Initial Investment} - \text{Salvage Value}) + \text{Additional Working Capital} + \text{Salvage Value}$**

In case the project has no salvage value and does not require additional working capital, you can compute average investment by the following formula:

**Average Investment =  $\frac{1}{2} (\text{Initial Investment})$**

Now, let us take an example to understand the computation and usage of ARR:

**Problem:** Elite Ltd. is planning to buy a machine costing ₹ 25,00,000 which will generate average annual PAT of ₹ 3,30,000 over the period of its useful life of 5 years. The machine will not have any salvage value after its useful life and it does not require any additional working capital. Using ARR,

suggest the Elite Ltd. as to whether it should invest in machine if the minimum required rate is 15%.

**Solution:** Here, initial investment is ₹ 25,00,000; average annual PAT is ₹ 3,30,000; salvage value is nil and the machine does not have any additional working capital requirement. Therefore, first compute the Average Investment by the following formula:

**Average Investment =  $\frac{1}{2}$  (Initial Investment)**

$$\text{Average Investment} = \frac{1}{2} (25,00,000) = ₹ 12,50,000$$

Now, compute the ARR by following formula:

**ARR = (Average Annual PAT/Average Investment) × 100**

$$\text{Accounting Rate of Return} = (3,30,000/12,50,000) \times 100 = 26.4\%$$

You should advise the company to purchase the machine as its ARR of 26.4% is higher than the minimum required rate of 15%.

## 6.7 MERITS AND DEMERITS OF ACCOUNTING RATE OF RETURN METHOD

The ARR method has the following merits:

- i) It is easy to understand and use.
- ii) The information required in this method is easily available from the accounting records.
- iii) It considers the economic benefit arising from a project during its lifetime.

The ARR method suffers from the following demerits:

- i) It is based on accounting profit which may be affected by the changes in accounting policies related to charging depreciation, valuation of inventory etc.
- ii) It gives equal ranks to mutually exclusive projects that have same ARR although they require different initial investment. In such a case, among such projects, the company should accept the project requiring lesser initial investment.
- iii) It gives equal ranks to mutually exclusive projects that have same ARR but different useful life. In such a case, among such projects, the company should accept the project that generates economic benefit over longer period of time.
- iv) It does not consider time value of money and gives same ranks to mutually exclusive projects with same ARR although they are different in terms of timing of economic benefit. In such a case, among such projects, the company should accept the project that generates more economic benefit during early years of project life.

Now, let us look at the Illustration 4, 5 and 6 to better understand the computation and use of ARR method:

**Illustration 4:** Sun Ltd. is planning to buy a machine costing ₹ 25,00,000 which will generate average annual PAT of ₹ 3,30,000 over the period of 5 years of its useful life. The machine requires an increase in working capital of ₹ 3,00,000 and will have residual value of ₹ 5,00,000 after its useful life. Using ARR, suggest whether Sun Ltd. should buy the machine if the minimum required rate is 15%.

**Solution:** Here, initial investment is ₹ 25,00,000; average annual PAT is ₹ 3,30,000; residual value is ₹ 5,00,000 and additional working capital requirement is ₹ 3,00,000. Therefore, first compute the average investment as given below:

$$\text{Average Investment} = \left\{ \frac{1}{2} (25,00,000 - 5,00,000) + 3,00,000 + 5,00,000 \right\} = ₹ 18,00,000$$

Now, compute the ARR as given below:

$$\text{ARR} = (3,30,000 / 18,00,000) * 100 = 18.33\%$$

You should advise the company to buy the machine as its ARR of 18.33% is higher than the minimum required rate of 15%.

**Illustration 5:** Neptune Ltd. is planning to buy a machine costing ₹ 25,00,000 which will generate Earnings before Depreciation and Taxes over its useful life of 5 years as:

Year	1	2	3	4	5
Earnings before Depreciation and Taxes (₹)	6,00,000	8,00,000	4,00,000	6,00,000	8,00,000

The machine requires an additional working capital of ₹ 3,00,000 and will have residual value of ₹ 5,00,000 after its useful life. The company uses straight line method of depreciation and pays tax @ 30%. Using ARR, suggest whether Neptune Ltd. should buy the machine if the minimum required rate is 15%.

**Solution:** Here, initial investment is ₹ 25,00,000; residual value is ₹ 5,00,000 and additional working capital requirement is ₹ 3,00,000. As the company uses straight line method of depreciation, first compute annual depreciation of machine by the following formula:

**Annual Depreciation = (Initial Investment-Residual Value)/Number of Years of Useful Life**

$$\text{Annual Depreciation} = (25,00,000 - 5,00,000) / 5 = ₹ 4,00,000$$

You are given earnings before depreciation and taxes during the useful life of the machine. Hence, now compute average annual PAT as given in the following table:

Years	Earnings before Depreciation and Taxes (₹)	Annual Depreciation (₹)	Profit before Tax (₹)	Tax (₹)	PAT (₹)
1	6,00,000	4,00,000	2,00,000	60,000	1,40,000
2	8,00,000	4,00,000	4,00,000	1,20,000	2,80,000
3	4,00,000	4,00,000	Nil	Nil	Nil
4	6,00,000	4,00,000	2,00,000	60,000	1,40,000
5	8,00,000	4,00,000	4,00,000	1,20,000	2,80,000
<b>Total PAT</b>					<b>8,40,000</b>
<b>Average Annual PAT (8,40,000/5)</b>					<b>1,68,000</b>

Now, compute the average investment as given below:

$$\text{Average Investment} = \{\frac{1}{2} (25,00,000 - 5,00,000) + 3,00,000 + 5,00,000\} = ₹ 18,00,000$$

Now, compute the ARR as given below:

$$\text{ARR} = (1,68,000 / 18,00,000) \times 100 = 9.33\%$$

You should advise the company not to buy the machine as its ARR of 9.33% is lower than the minimum required rate of 15%.

**Illustration 6:** The project manager of Primrose Limited has computed the ARR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
ARR (%)	12.50	14.0	11.73	15.39	13.64

The minimum required rate is 13%. The company has no restrictions on funds for investment. Advise the company about projects for investment if projects are (i) independent (ii) mutually exclusive.

### Solution

- i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project ARR is more than minimum required rate.

Comparing the ARR of each project with minimum required rate of 13%, you can find that Projects W ( $14.0\% > 13\%$ ), Y ( $15.39\% > 13\%$ ), and Z ( $13.64\% > 13\%$ ) have ARR more than the minimum required rate of 13%. However, Project M ( $12.50\% < 13\%$ ) and Project X ( $11.73\% < 13\%$ ) have ARR less than minimum required rate of 13%. Thus, you can advise the company to invest in Projects W, Y and Z.

- ii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the highest ARR among the projects having ARR more than minimum required rate.

You have already observed that Projects W, Y and Z have ARR more than the minimum required rate of 13%. Project Y has the highest ARR of 15.39% among these projects. Thus, you can advise the company to invest only in Project Y.

### Check Your Progress B

**1) Fill in the blanks with appropriate word.**

- i) The ARR is based on \_\_\_\_\_ instead of \_\_\_\_\_ from an investment project.
- ii) The ARR is \_\_\_\_\_ you earn on funds invested in project.
- iii) A project having \_\_\_\_\_ ARR as compared to some predetermined minimum acceptable rate is accepted while making capital budgeting decision.
- iv) The information required in \_\_\_\_\_ method is easily available from the accounting records.
- v) The mutually exclusive projects having same ARR but different initial investment are ranked \_\_\_\_\_ by the ARR method.
- vi) The ARR method \_\_\_\_\_ time value of money.

**2) State whether the following statements are True or False.**

- i) ARR method is a discounting cash flows method which is used for capital budgeting decisions.
- ii) ARR method is a measure of liquidity of the investment project.
- iii) Among mutually exclusive projects, the project having highest ARR is accepted.
- iv) ARR method takes into account economic benefit arising from a project during its lifetime.
- v) ARR is affected by changes in accounting policies.
- vi) Among the two mutually exclusive projects having same ARR but have different useful life, company should accept the project that generates economic benefit over longer period of time.

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## 6.8 LET US SUM UP

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The PBP method and the ARR method are two traditional or non-discounting cash flows methods used for capital budgeting. The PBP is the period in which you can recover amount originally invested in a project. While making capital budgeting decisions, you must accept a project with shorter PBP as compared to some predetermined PBP. The PBP method emphasizes liquidity, considers cash flows and the riskiness associated with an investment project. However, it suffers from the limitation of ignoring project useful life, residual value, cash flows after PBP and time value of money.

The ARR may be defined as a rate that a firm earns on the average funds committed to an investment project. While making capital budgeting

decisions, you must accept a project having higher ARR in comparison to some predetermined minimum acceptable rate. The ARR considers the economic benefits arising during the entire life of an investment project and can easily be computed using the information readily available from accounting records. However, it ignores time value of money and suffers from the limitation of using accounting profit which may change with changes in accounting policies. Moreover, it will give equal ranks to mutually exclusive projects with same ARR although they have different useful life or initial investment.

## 6.9 KEY WORDS

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**Average Annual PAT:** Computed by dividing total annual profits of a project by its useful life.

**Average Investment:** Computed by taking half of the value of initial investment in a project net of its salvage value and adding the salvage value to the figure so obtained.

**Accounting Rate of Return:** A rate earned on average funds committed to an investment project.

**Cash Flow after Tax:** Computed by adding back the depreciation to PAT.

**Mutually Exclusive Projects:** Projects among which the firm can accept only one.

**Payback Period:** The time period required to recover amount originally invested in a project.

## 6.10 ANSWERS TO CHECK YOUR PROGRESS

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- A) 1 (i) recover (ii) equal (iii) shorter (iv) cash flows (v) liquidity (vi) ignores (vii) cash outflows
- 2 (i) False (ii) True (iii) True (iv) True (v) False (vi) False (vii) False (viii) True (ix) True
- B) 1 (i) accounting profit, cash flows (ii) annualized return (iii) higher (iv) accounting rate of return (v) equal (vii) does not consider
- 2 (i) False (ii) False (iii) True (iv) True (v) True (vi) True

## 6.11 SELF-ASSESSMENT QUESTIONS/EXERCISES

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### Questions:

- 1) What is payback period? Explain the acceptance criteria using payback period method.
- 2) State the merits and demerits of payback period method.

- 3) Discuss payback period method for making capital budgeting decisions with suitable examples.
- 4) What is accounting rate of return? Explain the acceptance criteria of accounting rate of return method.
- 5) State the merits and demerits of accounting rate of return method.
- 6) Discuss accounting rate of return method for making capital budgeting decisions with suitable examples.

**Exercises:**

- 1) Riya Limited is considering investment in Machine X for which the following information is available:  
 Purchase Price of Machine X: ₹ 7,50,000; Installation Cost: ₹ 50,000; Useful Life: 5 Years; Estimated Scrap Value: Nil; Tax Rate: 30%, Earnings before Depreciation and Tax: ₹ 4,00,000 p.a.  
  - i) Calculate the PBP of Machine X.
  - ii) Suggest the Riya Limited as to whether it should invest in Machine X if the company has predetermined PBP of 3 Years.

[(i) PBP of Machine X = 2.439 years (ii) Riya Limited should invest in Machine X]
- 2) Sneha Limited is considering investment in Project X which requires original investment of ₹ 40,00,000 and generates CFAT during its life of 6 years as given below:

Year	1	2	3	4	5	6
CFAT (₹)	8,00,000	12,00,000	8,00,000	10,00,000	8,00,000	14,00,000

- i) Calculate the PBP of Project X.
  - ii) Suggest the Sneha Limited as to whether it should invest in Project X if the company has predetermined PBP of 3 years.

[(i) PBP of Project X = 4.25 years. (ii) Sneha Limited should not invest in Project X]
- 3) The project manager of New Horizons Limited has calculated the PBP of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
PBP (in Years)	3.25	4.12	5.35	4.75	2.62

The maximum acceptable PBP of company is 5.5 years. The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

- [(i) All the Projects M, W, X, Y, and Z (ii) Z]
- 4) Moon Ltd. is planning to buy a machine costing ₹ 10,00,000 which will generate average annual PAT of ₹ 1,40,000 over 5 years of its useful life.

The machine needs an additional working capital of ₹ 1,20,000 and will have residual value of ₹ 2,00,000 after its useful life. Using ARR, suggest whether Moon Ltd. should buy the machine if minimum required rate is 20%.

[ARR = 19.44%, Moon Ltd. should not purchase this machine]

- 5) Jupiter Ltd. is planning to buy a machine costing ₹ 50,00,000 which will generate Earnings before Depreciation and Taxes over its useful life of 5 years as:

Year	1	2	3	4	5
Earnings before Depreciation and Taxes (₹)	12,00,000	16,00,000	10,00,000	12,00,000	16,00,000

The machine requires an additional working capital of ₹ 6,00,000 and will have residual value of ₹ 10,00,000. The company uses straight line method of depreciation and pays tax @ 30%. Using ARR, suggest whether Jupiter Ltd. should buy the machine if minimum required rate is 9%.

[ARR = 10.11%, Jupiter Ltd. should purchase this machine]

- 6) The project manager of Goodluck Limited has computed the ARR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
ARR (%)	14.45	13.25	12.92	17.25	16.27

The minimum required rate is 14%. The company has no restrictions on funds for investment. Advise the company about projects for investment if projects are (i) independent (ii) mutually exclusive.

[(i) Projects M, Y and Z (ii) Y]

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 7 TECHNIQUES OF CAPITAL BUDGETING-II**

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### **Structure**

- 7.0 Objectives
  - 7.1 Introduction
  - 7.2 Net Present Value
  - 7.3 Computation of Net Present Value
  - 7.4 Merits and Demerits of Net Present Value Method
  - 7.5 Internal Rate of Return
  - 7.6 Computation of Internal Rate of Return
    - 7.6.1 Equal Annual Cash Inflows
    - 7.6.2 Unequal Annual Cash Inflows
  - 7.7 Merits and Demerits of Internal Rate of Return Method
  - 7.8 Capital Rationing
  - 7.9 Let Us Sum Up
  - 7.10 Key Words
  - 7.11 Answers to Check Your Progress
  - 7.12 Self-Assessment Questions/Exercises
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### **7.0 OBJECTIVES**

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After studying this unit, you should be able to:

- explain and compute Net Present Value;
  - discuss the merits and demerits of Net Present Value method;
  - explain and compute Internal Rate of Return ;
  - discuss the merits and demerits of Internal Rate of Return method; and
  - discuss the concept and process of capital rationing.
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### **7.1 INTRODUCTION**

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In Unit-6, you have understood the Payback Period Method and the Accounting Rate of Return Method which are the traditional or non-discounting cash flows methods used for making capital budgeting decisions. In present unit, you will learn the Net Present Value and Internal Rate of Return Method which are two discounted cash flows or time adjusted methods used for making capital budgeting decisions. Moreover, you will also learn the concept and process of capital rationing in the present unit.

## 7.2 NET PRESENT VALUE

The Net Present Value (NPV) refers to the surplus of total present values of cash inflows estimated to be generated from the project over total present values of cash outflows spent or expected to be spent on the project.

**The following is the acceptance criteria of NPV Method:**

While making capital budgeting decisions, you must accept a project having positive NPV as its acceptance implies addition to shareholders wealth. If you want to choose among mutually exclusive projects then you must accept the one having largest NPV among the projects having positive NPV.

## 7.3 COMPUTATION OF NET PRESENT VALUE

The following are the steps for computation of Net Present Value:

- i) Compute the present value (PV) of expected cash inflows by multiplying present value factor (PVF) at a given discount rate with expected cash inflows over the project life.
- ii) Add the PV of expected cash inflows computed in step (i).
- iii) Compute the PV of cash outflows spent or expected to be spent by multiplying PVF at a given discount rate with cash outflows spent or expected to be spent over the project life.
- iv) Add the PV of cash outflows computed in step (iii).
- v) Deduct total PV of cash outflows calculated in step (iv) from the total PV of expected cash inflows computed in step (ii) to obtain NPV.

You must keep in mind the following points while computing NPV:

- i) The discount rate for the computation of NPV is the minimum required rate of return on the funds committed to the project which is also known as cost of capital.
- ii) The PVF at a certain discount rate  $r\%$  for  $n$ th period can be computed as:

$$PVF(r\%, n) = 1/(1+r)^n$$

For example, the PVF at 10% discount rate for 1 year is computed as:

$$PVF(10\%, 1) = 1/(1+.10)^1 = 0.909.$$

- iii) The PVF ( $r\%$ ,  $n$ ) can also be obtained from the PV table which provides present values of a future amount at various rates for different time periods.
- iv) If a project is expected to generate constant annual cash inflows for  $n$  periods, then its total PV of cash inflows is computed by multiplying the Present Value Annuity Factor (PVAF) for  $n$  period at discount rate of  $r$  by the constant annual cash inflows. The PVAF ( $r\%$ ,  $n$ ) can be obtained

from the PV of a future annuity table which provides present values of a future annuity at various rates for different time periods.

- v) The additional working capital requirement for the project is considered as cash outflow in year in which it is required. The working capital released and salvage value realized at the end of project life is taken as cash inflow in that year.
- vi) Sales proceeds of the old machine and tax savings on loss on sale of old machine are deducted from cost of new machine for computing incremental cash outflow of new machine while making decision of replacement of old machine by new machine. However, in such case, additional tax liability on gain on sale of old machine is added to cost of new machine for computing incremental cash outflow of new machine.

Now, let us take an example to understand the computation and usage of NPV:

If a project with initial investment of ₹ 10 lakhs with useful life of 6 years is expected to generate cash inflows as given below:

Year	I	II	III	IV	V	VI
Cash Inflows (₹ '000)	225	183	355	385	315	425

If discount rate is 10%, you can compute NPV of project as given below:

Year	Cash Inflows (₹)	PVF at 10%	PV of Cash Inflows (₹)
I	2,25,000	0.909	2,04,525
II	1,83,000	0.826	1,51,158
III	3,55,000	0.751	2,66,605
IV	3,85,000	0.683	2,62,955
V	3,15,000	0.621	1,95,615
VI	4,25,000	0.564	2,39,700
<b>Total PV of Cash Inflows</b>			13,20,558
<b>Less Initial Investment*</b>			10,00,000
<b>NPV</b>			3,20,558

\* Initial investment is taken as PV of cash outflows as the project does not require any other cash outflow during its life.

You can clearly see from the above table that the project has positive NPV of ₹ 3,20,558 and hence the project should be accepted.

## **7.4 MERITS AND DEMERITS OF NET PRESENT VALUE METHOD**

The following are the merits of NPV method:

- i) It uses the cash flows instead of accounting profit of a project.
- ii) It considers all cash inflows and cash outflows of a project.
- iii) It considers time value of money as it recognizes timing of the cash flows by making them comparable through finding their PV at a given discount rate.
- iv) It is consistent with the wealth maximization objective of financial management as acceptance of a project having positive NPV clearly implies addition to the wealth of shareholders as it will generate returns more than the minimum returns required on the funds committed to the project.

The NPV method suffers from the following demerits:

- i) It is difficult as compared to PB Period or ARR method.
- ii) It may not give reliable results because of the errors in the estimation of cost of capital or discount rate. H. Bier Jr. and S. Smidt suggest the rate should be closer to a default free interest rate than to that rate required by shareholders. The firm should not use single discount rate for two problems (time and risk).
- iii) It gives equal ranks to mutually exclusive projects having same NPV but different economic life. However, the project having shorter economic life should be preferred in such case.
- iv) It gives equal ranks to mutually exclusive projects having same NPV but different cash outflows required. However, the project generating higher returns per rupee invested should be preferred in such case. This limitation of NPV method can be overcome using Profitability Index which is computed by dividing PV of cash inflows by PV of cash outflows.

Consider following example to better understand this demerit:

Galileo Ltd. is considering investment in mutually exclusive Project X or Project Y having following details:

	<b>Project X</b>	<b>Project Y</b>
PV of Cash Outflows (₹ lakhs)	25	30
Present Value of Cash Inflows (₹ lakhs)	30	35
NPV (₹ lakhs)	5	5
Profitability Index	<b>1.2</b>	1.17

You can clearly see from the above table that the NPV of Project X and Project Y are same and hence both these projects are ranked equally by NPV

method. However, the Profitability Index of Project X is more than that of Project Y and hence Project X should be considered better than Project Y although both of them have same NPV.

Now, let us look at the Illustration 1, 2 and 3 to be clearer about the computation and use of Net Present Value Method.

**Illustration 1:** Marigold Limited is considering investment in Machine X which requires Original Investment of ₹ 8,50,000 and generates Earnings before Depreciation and Taxes (EBDT) during its eight years of life as given below:

Year	1	2	3	4	5	6	7	8
<b>EBDT (₹)</b>	1,20,000	1,50,000	1,10,000	1,20,000	1,45,000	1,60,000	1,65,000	1,25,000

The Machine X has a salvage value of ₹ 50,000 and is depreciated using Straight Line Method (SLM) of Depreciation during useful life of 8 years. The company is subject to tax rate of 30%. Using NPV method, suggest the Marigold Limited as to whether it should invest in Machine X if the discount rate is 12%.

**Solution:** As the company uses SLM of Depreciation, first compute annual depreciation of Machine X as given below:

$$\text{Annual Depreciation of Machine X} = (8,50,000 - 50,000)/8 = ₹ 1,00,000$$

Now, compute the NPV of Machine X as given in the following table:

Year	EBDT (₹) (1)	Depreci ation (₹) (2)	PBT (₹) (3)= (1)-(2)	Tax (₹) (4)=(3)*0.30	PAT (₹) (5)= (3)-(4)	CFAT (₹) (6)=(5)+(2)	PVF at 12% (7)	PV of CFAT (₹) (8)=(6)x(7)
1	1,20,000	1,00,000	20,000	6,000	14,000	1,14,000	0.893	1,01,802
2	1,50,000	1,00,000	50,000	15,000	35,000	1,35,000	0.797	1,07,595
3	1,10,000	1,00,000	10,000	3,000	7,000	1,07,000	0.712	76,184
4	1,20,000	1,00,000	20,000	6,000	14,000	1,14,000	0.636	72,504
5	1,45,000	1,00,000	45,000	13,500	31,500	1,31,500	0.567	74,561
6	1,60,000	1,00,000	60,000	18,000	42,000	1,42,000	0.507	71,994
7	1,65,000	1,00,000	65,000	19,500	45,500	1,45,500	0.452	65,766
8	1,25,000	1,00,000	25,000	7,500	17,500	1,17,500	0.404	47,470
<b>Salvage Value Realized at the end of 8<sup>th</sup> Year</b>						50,000	0.404	20,200
<b>Total PV of CFAT</b>								6,38,076
<b>Less Original Investment in Machine X</b>								8,50,000
<b>NPV of Machine X</b>								(2,11,924)

You can clearly see from the above table that the Machine X has a negative NPV of ₹ 2,11,924 and hence you can advise Marigold Limited not to invest in Machine X.

**Illustration 2:** Glory Limited is considering investment in Machine Y for replacement of existing Machine X having a remaining life of 5 years, book value of ₹ 5,00,000 at present, salvage value nil. However, Machine X can be sold presently at ₹ 2,00,000. The Machine Y has useful life of 5 years, cost ₹ 10,00,000 and has nil salvage value. The purchase of Machine Y to replace Machine X will generate an annual cost savings of ₹ 5,00,000 per annum over its useful 5 years life. The company uses SLM of Depreciation and is subject to tax rate of 30%. Using NPV method, suggest the Glory Limited as to whether it should replace Machine X by Machine Y if the discount rate is 12%.

**Solution:** First compute Incremental Cash Outflow of Machine Y as given in the following table:

Cost of Machine Y	₹ 10,00,000
Less Sales Proceeds of Machine X	₹ (2,00,000)
Less Tax Savings of Loss on sale of Machine X [(5,00,000-2,00,000) 0.30]	₹ ( 90,000)
Incremental Cash Outflows of Machine Y	₹ 7,10,000

Now calculate PV of Incremental Cash Inflows of Machine Y as given in the following table:

Annual Incremental EBDT from Machine Y (same as annual cost savings)	₹ 5,00,000
Less Annual Incremental Depreciation of Machine Y (2,00,000-1,00,000)	₹ (1,00,000)
Annual Incremental PBT	₹ 4,00,000
Less Annual Incremental Tax	₹ (1,20,000)
Annual Incremental PAT	₹ 2,80,000
Add Annual Incremental Depreciation of Machine Y	₹ 1,00,000
Annual Incremental CFAT of Machine Y	₹ 3,80,000
PVAF at 12% for 5 years	3.605
Total PV of Incremental CFAT of Machine Y [(3,80,000) 3.605]	₹ 13,69,900
Less Incremental Cash Outflows of Machine Y	₹ (7,10,000)
Incremental NPV of Machine Y	₹ 6,59,900

You can clearly see from the above table that the Machine Y has an incremental NPV of ₹ 6,59,900 over Machine X and hence you can advise Glory Limited to replace Machine X by Machine Y.

**Illustration 3:** The project manager of Discovery Limited has calculated the NPV of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
NPV at discount rate of 12% (₹)	2,25,925	2,09,322	-95,507	1,22,700	3,08,233

The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

**Solution:**

- i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project has positive NPV.

You can clearly see that the Projects M (NPV of ₹ 2,25,925), W(NPV of ₹ 2,09,322), Y (NPV of ₹ 1,22,700) and Z ( NPV of ₹ -95,507) have positive NPV. However, the NPV of Project X (NPV of ₹ -95,507) is negative. Thus, you can advise the company to invest in Projects M, W, Y and Z.

- ii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the largest positive NPV. You have already observed that the Projects M, W, Y and Z have positive NPV. Project Z has the largest positive NPV of ₹ 3,08,233 among these projects. Thus, you can advise the company to invest only in Project Z.

**Check Your Progress A**

**1) Fill in the blanks with appropriate word**

- i) While making capital budgeting decisions, you must accept a project with a \_\_\_\_\_ NPV.
- ii) The discount rate for the computation of NPV is the \_\_\_\_\_ on the funds committed to the project.
- iii) The release of \_\_\_\_\_ and \_\_\_\_\_ at the end of project life is taken as cash inflow of that year.
- iv) Sales proceeds of the old machine is \_\_\_\_\_ from cost of new machine while calculating incremental cash outflows of new machine for making decision of replacement of old machine by new machine.
- v) NPV method takes into account all the \_\_\_\_\_ and \_\_\_\_\_ associated with a project.
- vi) NPV method is consistent with the \_\_\_\_\_ objective of financial management.
- vii) NPV method may not give reliable results because of the errors in the estimation of \_\_\_\_\_.

viii) \_\_\_\_\_ is better than NPV method for ranking mutually exclusive projects having same NPV but different cash outflows required.

**1) State whether the following statements are True or False.**

- i) The NPV refers to the surplus of total present values of cash outflows spent or expected to be spent over total present values of cash inflows expected to be generated from the project.
- ii) Among mutually exclusive projects, a project having largest positive NPV is accepted.
- iii) The PVF at a certain discount rate  $r\%$  for  $n^{\text{th}}$  period is equal to  $1*(1+r)^n$ .
- iv) Additional working capital requirement for the project is considered as cash inflow in the year in which it is required.
- v) NPV method uses the cash flows rather than the accounting profit of a project.
- vi) NPV method does not consider time value of money.
- vii) NPV method is simple to understand and use.
- viii) NPV method gives equal ranks to mutually exclusive projects having same NPV but different economic life.

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## 7.5 INTERNAL RATE OF RETURN

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Internal rate of return (IRR) is the discount rate that makes Present value (PV) of cash outflows equal to PV of cash inflows of an investment project. The term ‘Internal Rate of Return’ is used in three senses. It is the rate of growth of an investment, secondly, it is the highest rate of interest that an investor could pay for borrowed funds to finance the investment. The third interpretation is that the rate of discount (interest) that equates Net Present Value of cash inflows with present value of outflows.

**The following is the acceptance criteria of IRR Method:**

While making capital budgeting decisions, you must accept a project having IRR more than cost of capital. If you want to choose among mutually exclusive projects then you must accept the one having largest IRR among the projects having IRR greater than cost of capital.

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## 7.6 COMPUTATION OF INTERNAL RATE OF RETURN

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While computing IRR you may have the projects having either equal or unequal annual cash inflows. The computation of IRR in both the situations is explained below:

### 7.6.1 Equal Annual Cash Inflows

When the annual cash inflows of an investment project are equal, you can compute the IRR using the following steps:

- i) Computed the PB Period of the project as discussed in Unit 6.
- ii) Using the PVAF table find out the two discount rates nearest to PB Period (one higher and one lower) in the row corresponding to the life of the project. Also find out PVAF at these interest rates.
- iii) Use interpolation method to find IRR as given below:

$$\text{IRR} = \frac{\text{Lower Discount Rate} + (\text{PVAF at Lower Discount Rate} - \text{PB Period})}{(\text{PVAF at Lower Discount Rate} - \text{PVAF at Higher Discount Rate})}$$

**Note:** It is important to note here that the reciprocal of PBP is a good approximation of IRR for projects having equal annual cash inflows with the life of at least twice the PBP.

Now, let us take an example to understand the computation and usage of IRR in such a case:

If a project requires original investment of ₹ 10,00,000 and provides annual cash inflows of ₹ 4,00,000 during its useful life of four years.

You can compute the IRR using following steps:

- i) First compute PB Period of the project as:  
 $\text{PB Period} = (10,00,000 / 4,00,000) = 2.5 \text{ years}$
- ii) Using the PVAF table find out the two discount rates nearest to 2.5 in the row corresponding to period 4. The lower rate is 21% with PVAF as 2.540 and higher rate is 22% with PVAF 2.494.
- iii) Use interpolation method to find IRR as given below:

$$\text{IRR} = 21\% + (2.540 - 2.5) / 2.540 - 2.494 = 21\% + 0.4 / 0.046 = 21.87\%.$$

The IRR of the project is 21.87% which means that the PV of cash outflows and PV of cash inflows of the project are equal at 21.87% discount rate.

If cost of capital is 15%, you should accept above project as it has IRR of 21.87% which is more than cost of capital of 15%.

### 7.6.2 Unequal Annual Cash Inflows

When the annual cash inflows of an investment project are unequal, you can compute the IRR using the following steps:

- i) Compute the assumed PB Period of the project as given below:  
 $\text{Assumed PB Period} = \text{Cash Outflows} / \text{Average Annual Cash Inflows}$
- ii) Using the PVAF table find out the two discount rates nearest to assumed PB Period (one higher and one lower) in the row corresponding to the life of the project. Also find out PVAF at these discount rates.

- iii) Calculate NPV of the project at the two discount rates computed in (ii) above. If you get one positive and one negative NPV, then use interpolation method to find IRR as given below:
- iv) 
$$\text{IRR} = \text{Lower Discount Rate} + (\text{NPV at Lower Discount Rate}) (\text{Higher Discount Rate} - \text{Lower Discount Rate}) / (\text{NPV at Lower Discount Rate} - \text{NPV at Higher Discount Rate})$$

If both NPVs at discount rates computed in (ii) above are positive, then increase the higher discount rate till you get a discount rate at which NPV is negative. If both NPVs at discount rates computed in (ii) above are negative, then decrease the lower discount rate till you get a discount rate at which NPV is positive. Now, use the interpolation method as discussed above to find IRR using NPVs of different sign.

Now, let us take an example to understand the computation and usage of IRR in such a case:

If a project with initial investment of ₹ 10,50,000 having useful life of 5 years generates cash inflows as given below:

Year	I	II	III	IV	V
Cash Inflows (₹ lakhs)	2	3	4	3.5	2.5

You can compute IRR of above projects using the following steps:

- i) Compute Average Annual Cash Inflows as:

$$\text{Average Annual Cash Inflows} = \\ (2,00,000+3,00,000+4,00,000+3,50,000+2,50,000)/5 = 3,00,000$$

- ii) Compute the assumed PB Period as:

$$\text{assumed PB Period} = 10,50,000 / 3,00,000 = 3.5$$

- iii) Using the PVAF table find out the two discount rates nearest to 3.5 in the row corresponding to 5 period. The lower rate is 13% with PVAF as 3.517 and higher rate is 14% with PVAF 3.433.

- iv) Calculate NPV of the project at 13% as given in the following table:

Year	Cash Inflows (₹)	PVF at 13%	PV of Cash Inflows at 13% (₹)	PVF at 12%	PV of Cash Inflows at 12% (₹)
I	2,00,000	0.885	1,77,000	0.893	1,78,600
II	3,00,000	0.783	2,34,900	0.797	2,39,100
III	4,00,000	0.693	2,77,200	0.712	2,84,800
IV	3,50,000	0.613	2,14,550	0.636	2,22,600
V	2,50,000	0.543	1,35,750	0.567	1,41,750
<b>Total PV of Cash Inflows</b>			10,39,400		10,66,850
<b>Less Initial Investment</b>			10,50,000		10,50,000
<b>NPV</b>			(10,600)		16,850

You can see from the above table that NPV of the project is negative ₹ 10,600 at 13% discount rate and hence there is no need to find NPV at a higher discount rate of 14% which will further be a higher negative figure. Thus, to find a positive NPV reduce discount rate from 13% to 12% and find the NPV of the project at 12% discount rate that is ₹ 16,850 as given in above table.

- v) Compute IRR of the project using interpolation method as given below:

$$\text{IRR} = 12\% + (16,850) (13\% - 12\%) / \{16,850 - (-10,600)\} = 12\% + (16,850) (1\%) / (27,450) = 12\% + 0.61\% = 12.61\%.$$

Therefore, the IRR of the project is 12.61% which means that the PV of cash outflows and PV of cash inflows of the project are equal at 12.61% discount rate.

If cost of capital is 15%, you should reject above project as it has IRR of 12.61% which is less than cost of capital of 15%.

## 7.7 MERITS AND DEMERITS OF INTERNAL RATE OF RETURN METHOD

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The IRR method has the following merits:

- i) It uses cash flows instead of accounting profit of a project.
- ii) It considers all cash inflows and cash outflows of a project.
- iii) It is consistent with the wealth maximization objective of financial management as acceptance of a project with IRR greater than cost of capital clearly implies that the project will add to the wealth of shareholders as it will generate returns more than the minimum returns required on the funds committed to the project.
- iv) It considers time value of money as it recognizes timing of the cash flows by making them comparable through finding their PV.

The IRR method suffers from the following demerits:

- i) It is difficult as compared to PB Period, ARR and NPV method.
- ii) It is based on the assumption that cash inflows generated during the project life are reinvested at IRR and hence, it may give unreliable results in comparing mutually exclusive projects having different IRR because it is not possible for the same firm at the same time to reinvest cash inflows at two different rates.
- iii) It may give indeterminate or multiple IRR for project requiring cash outflows in subsequent years of project life.

**Note:** It is important to note here that although both NPV and IRR method use entire cash flows from an investment project, consider time value of money and are consistent with shareholders wealth maximization, yet they will give similar results only for conventional independent projects. However, they may give conflicting results for mutually exclusive projects with different cash outflows or different pattern of cash flows or different

lives. In such cases, you must rely on NPV method as it is based on more realistic assumption of reinvestment of cash inflows generated during the project life at discount rate rather than at IRR as assumed in IRR method.

Now, let us look at the Illustration 4, 5 and 6 to better understand the computation and use of IRR method:

**Illustration 4:** From the information given in Illustration 1, using IRR method, suggest the Marigold Limited as to whether it should invest in Machine X if the cost of capital is 12%.

**Solution:** You have already computed CFAT of Machine X in Illustration 1 as given below:

Year	1	2	3	4	5	6	7	8
<b>CFAT (₹)</b>	1,14,000	1,35,000	1,07,000	1,14,000	1,31,500	1,42,000	1,45,500	1,67,500

Now, use the following steps to compute IRR of the above project:

- Compute Average Annual Cash Inflows as:

$$\text{Average Annual Cash Inflows} =$$

$$(1,14,000 + 1,35,000 + 1,07,000 + 1,14,000 + 1,31,500 + 1,42,000 + 1,45,500 + 1,67,500) / 8 = ₹1,32,063$$

- Compute the assumed PB Period as:

$$\text{Assumed PB Period} = 8,50,000 / 1,32,063 = 6.436$$

- Using the PVAF table find out the two discount rates nearest to 6.436 in the row corresponding to period 8. The lower rate is 5% with PVAF as 6.463 and higher rate is 6% with PVAF 6.210.

- Calculate NPV of Machine X at 5% as given in the following table:

Year	Cash Inflows (₹)	PVF at 5%	PV of Cash Inflows at 5% (₹)	PVF at 4%	PV of Cash Inflows at 4% (₹)
1	1,14,000	0.952	1,08,528	0.962	1,09,668
2	1,35,000	0.907	1,22,445	0.925	1,24,875
3	1,07,000	0.864	92,448	0.889	95,123
4	1,14,000	0.823	93,822	0.855	97,470
5	1,31,500	0.784	1,03,096	0.822	1,08,093
6	1,42,000	0.746	1,05,932	0.790	1,12,180
7	1,45,500	0.711	1,03,451	0.760	1,10,580
8	1,67,500	0.677	1,13,398	0.731	1,22,443
<b>Total PV of Cash Inflows</b>			8,43,120		8,80,432
<b>Less Initial Investment</b>			8,50,000		8,50,000
<b>NPV</b>			(6,880)		30,432

You can see from the above table that NPV of Machine X is negative ₹ 6,880 at 5% discount rate and hence there is no need to find NPV at a higher discount rate of 6% which will further be a higher negative figure. Thus, to find a positive NPV reduce discount rate from 5% to 4% and find the NPV of Machine X at 4% discount rate that is ₹ 30,432 as given in above table.

vi) Compute IRR of Machine X using interpolation method as given below:

$$\text{IRR} = 4\% + (30,432) (5\% - 4\%) / \{30,432 - (-6,880)\} = 4\% + (30,432) (1\%) / (37,312) = 4\% + 0.82\% = 4.82\%.$$

You can see that IRR of Machine X is 4.82% which is less than cost of capital of 12% and hence you should advise Marigold Limited for not investing in Machine X.

**Illustration 5:** Mars Limited is considering investment in Machine Y for replacement of existing Machine X having remaining life of 5 years, book value of ₹ 5 lakhs at present, salvage value of nil. However, Machine X can be sold presently at ₹ 2 lakhs. The Machine Y cost ₹ 10 lakhs, has useful life of 5 years, salvage value of ₹ Nil. The purchase of Machine Y to replace Machine X will generate an annual cost savings of ₹ 3 lakhs per annum over next 5 years. The company charges depreciation by SLM and is subject to tax rate of 30%. Using IRR method, suggest the Mars Limited as to whether Machine X be replaced by Machine Y if cost of capital is 12%.

**Solution:** First compute Incremental Cash Outflow of Machine Y as given in the following table:

Cost of Machine Y	₹ 10,00,000
Less Sales Proceeds of Machine X	₹ (2,00,000)
Less Tax Savings of Loss on sale of Machine X [(5,00,000-2,00,000) 0.30]	₹ (90,000)
Incremental Cash Outflows of Machine Y	₹ 7,10,000

Now compute PV of Incremental Cash Inflows of Machine Y as given in the following table:

Annual Incremental EBDT from Machine Y (same as annual cost savings)	₹ 3,00,000
Less Annual Incremental Depreciation of Machine Y (2,00,000-1,00,000)	₹ (1,00,000)
Annual Incremental PBT	₹ 2,00,000
Less Annual Incremental Tax	₹ (60,000)
Annual Incremental PAT	₹ 1,40,000
Add Annual Incremental Depreciation of Machine Y	₹ 1,00,000
Annual Incremental CFAT of Machine Y	₹ 2,40,000

You can clearly see from the above tables that the Machine Y has an incremental Cash Outflow of ₹ 7,10,000 and Incremental CFAT of ₹

2,40,000 per annum for next 5 years. Now, you can compute IRR of Machine Y using following steps:

- i) First compute PB Period of the Machine Y as:

$$\text{PB Period} = (7,10,000/2,40,000) = 2.96 \text{ years}$$

- ii) Using the PVAF table find out the two discount rates nearest to 2.96 in the row corresponding to period 5. The lower rate is 20% with PVAF as 2.991 and higher rate is 21% with PVAF 2.926.

- iv) Use interpolation method to find IRR as given below:

$$\text{IRR} = 20\% + (2.991 - 2.96)/ 2.991 - 2.926 = 20\% + 0.031/0.065 = 20.48\%.$$

The IRR of Machine Y is 20.48% which is more than cost of capital of 12% and hence, you should advise Mars Limited to replace Machine Y by Machine X.

**Illustration 6:** The project manager of Emerald Limited has calculated the IRR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	12.25%	15%	16.75%	14.20%	13.45

The cost of capital is 13% and the company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

**Solution:** (i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project IRR is more than cost of capital. You can clearly see that the Projects W ( $15\% > 13\%$ ), X ( $16.75\% > 13\%$ ), Y ( $14.20\% > 13\%$ ) and Z ( $13.45\% > 13\%$ ) have IRR more than cost of capital. However, IRR of Project M ( $12.25\% < 13\%$ ) is less than cost of capital. Thus, you can advise the company to invest in Projects W, X, Y and Z.

(ii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the largest IRR among the projects with IRR greater than cost of capital. You have already observed that the Projects W, X, Y and Z have IRR greater than cost of capital. Project X has largest IRR of 16.75% among these projects. Thus, you can advise the company to invest only in Project X.

## 7.8 CAPITAL RATIONING

The capital rationing is the process of allocation of firm's fixed capital expenditure budget to financially viable independent investment projects in such a manner that maximizes the wealth of shareholders. The need for capital rationing arises when a firm has fixed capital expenditure budget which is insufficient for acceptance of all financially viable independent investment projects. In such case, available funds are allocated among different projects in such a manner that maximizes the total NPV.

In capital rationing, the projects under consideration may be indivisible or divisible. The indivisible project is the project that has to be accepted in totality which means that the firm can either accept it in full or reject it depending upon the availability of funds. The divisible project is the project that can be accepted in totality or in part depending upon the availability of funds.

While performing capital rationing, the available financially viable independent investment projects are ranked in order of NPV. Then, optimum combination of projects is selected that maximizes the total NPV by allocation of entire fixed capital expenditure budget for divisible projects or maximum possible amount of fixed capital expenditure budget for indivisible projects.

Now, let us look at the Illustration 7 to better learn capital rationing process:

**Illustration 7:** Project manager of Mercury Limited has a fixed capital expenditure budget of ₹ 50 lakhs. He has calculated the NPV of four independent financially viable investment projects which requires a total investment of ₹ 70 lakhs. The project manager has summarized the calculated information in the following table:

Projects	Initial Investment (₹ lakhs)	PV of CFAT (₹ lakhs)	NPV (₹ lakhs)
A	15	21.23	6.23
B	25	45.82	20.82
C	20	32.68	12.68
D	10	13.25	3.25

Advise the company about the projects for investment if the projects are (i) indivisible (ii) divisible.

**Solution:** First rank the projects in order of NPV as given in the following table:

Projects	Initial Investment (₹ lakhs)	NPV (₹ lakhs)	Rank as per NPV
A	15	6.23	3
B	25	20.82	1
C	20	12.68	2
D	10	3.25	4

- i) When projects are indivisible, company should invest in Project B and Project C which require total Initial Investment of ₹ 45 lakhs and provide maximum total NPV of ₹ 33.5 lakhs. The company is left with ₹ 5 lakhs as unspent amount because the acceptance of next financially viable project i.e. Project A requires Initial Investment of ₹ 15 lakhs. Hence, you should advise Mercury Limited to accept Project B and Project C only.

- ii) When the projects are divisible, the company can further use the unspent amount of ₹ 5 lakhs of (i) above for acceptance of 1/3<sup>rd</sup> (₹ 5 lakhs/₹ 15 lakhs) of Project A. Thus, you should advise Mercury Limited to invest in Project B, Project C and 1/3<sup>rd</sup> of Project A which require the total Initial Investment of ₹50 lakhs and provide maximum total NPV of ₹ 35.8 lakhs.

### **Check Your Progress B**

#### **1) Fill in the blanks with appropriate word**

- i) IRR is the rate that makes PV of \_\_\_\_\_ equal to PV of \_\_\_\_\_ of an investment project.
- ii) While making capital budgeting decisions, you must accept a project having IRR \_\_\_\_\_ than cost of capital.
- iii)  $IRR = \text{Lower Discount Rate} + (\text{PVAF at Lower Discount Rate} - \text{PVAF at Higher Discount Rate}) / (\text{PVAF at Higher Discount Rate} - \text{PVAF at Lower Discount Rate})$ .
- iv) PB Period = Cash Outflows/\_\_\_\_\_.
- v)  $IRR = \text{Lower Discount Rate} + (\text{NPV at Lower Discount Rate} - \text{NPV at Higher Discount Rate}) / (\text{NPV at Higher Discount Rate} - \text{NPV at Lower Discount Rate})$ .
- vi) IRR method is consistent with the \_\_\_\_\_ objective of financial management.
- vii) IRR method is based on the assumption of reinvestment of cash inflows generated during project life at \_\_\_\_\_.
- viii) IRR method may give \_\_\_\_\_ or \_\_\_\_\_ IRR for project requiring cash outflows in subsequent years of project life.
- ix) The capital rationing is the process of allocation of firm's \_\_\_\_\_ to financially viable independent investment projects in such a manner that maximizes the \_\_\_\_\_.
- x) In case of contradictory results by IRR and NPV for mutually exclusive projects, you must rely on \_\_\_\_\_.

#### **2) State whether the following statements are True or False.**

- i) IRR is the discount rate at which the project has positive NPV.
- ii) Among mutually exclusive projects, accept a project having largest IRR among the projects with IRR greater than cost of capital.
- iii) If NPVs at two discount rates computed are positive, then the higher discount rate is increased till you get a discount rate at which NPV is negative for computation of IRR.
- iv) IRR method uses accounting profit rather than cash flows of a project.
- v) IRR method considers all cash inflows and cash outflows associated with a project.

- vi) IRR method does not consider time value of money.
- vii) IRR method is difficult to understand and use.
- viii) The indivisible project is the project that can be partly accepted.
- ix) In case of conventional independent investment projects both IRR and NPV give contradictory results.
- x) PBP reciprocal is a good approximation of IRR for projects having constant annual cash inflows with the life of at least twice the PBP.

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## 7.9 LET US SUM UP

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The NPV method and IRR method are two discounted cash flows methods used for making capital budgeting decisions. The NPV refers to the surplus of total PV of cash inflows over total PV of cash outflows of investment project. While making capital budgeting decisions, you must accept a project having positive NPV. The IRR is the discount rate that makes PV of cash inflows equal to PV of cash outflows of investment project. While making capital budgeting decisions, you must accept a project having IRR more than cost of capital.

Both NPV and IRR methods use entire cash flows from an investment project, consider time value of money and are consistent with wealth maximization. NPV method suffers from the limitations of being difficult to understand and is based on discount rate which may be subject to estimation errors. Moreover, it gives equal ranks to mutually exclusive projects having same NPV although they have different economic life or different cash outflows required. IRR method suffers from the limitations of being difficult to understand and may give unreliable results in case of mutually exclusive projects with different IRR because of its assumption of reinvestment of cash inflows generated during the project life at IRR. Moreover, it may give indeterminate or multiple IRR for project requiring cash outflows in subsequent years of project life.

A firm has to use the concept of capital rationing if it has fixed capital expenditure budget due to which it is not able to accept all financially viable independent investment projects. The capital rationing is the process of allocation of firm's fixed capital expenditure budget to financially viable independent investment projects in such a manner that maximizes the wealth of shareholders.

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## 7.10 KEY WORDS

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**NPV:** Excess of total present values of cash inflows over total present values of cash outflows from an investment project.

**Discount Rate:** Minimum required rate on the funds committed to project also known as cost of capital.

**Profitability Index:** Calculated by dividing PV of cash inflows by PV of cash outflows from an investment project.

**IRR:** Discount rate that makes PV of cash outflows equal to PV of cash inflows of investment project.

**Capital Rationing:** Process of allocation of fixed capital expenditure budget to financially viable independent investment projects in such a manner that maximizes the wealth of shareholders.

## 7.11 ANSWERS TO CHECK YOUR PROGRESS

- A) 1 (i) positive (ii) minimum required rate of return (iii) working capital, salvage value (iv) deducted (v) cash inflows, cash outflows (vi) wealth maximization (vii) discount rate (viii) Profitability index method  
2 (i) False (ii) True (iii) False (iv) False (v) True (vi) False (vii) False (viii) True
- B) 1 (i) cash inflows, cash outflows (ii) more (iii) PB Period, lower, higher (iv) average annual cash inflows (v) lower, lower, higher (vi) wealth maximization (vii) IRR (viii) indeterminate, multiple (ix) fixed capital expenditure budget, wealth of shareholders (x) NPV method  
2 (i) False (ii) True (iii) True (iv) False (v) True (vi) False (vii) True (viii) False (ix) False (x) True

## 7.12 SELF-ASSESSMENT QUESTIONS/EXERCISES

### Questions:

- 1) What is NPV? Explain acceptance criteria using NPV method.
- 2) State the merits and demerits of NPV method.
- 3) Discuss NPV method for making capital budgeting decisions with suitable examples.
- 4) What is IRR? Explain acceptance criteria of IRR method.
- 5) State the merits and demerits of IRR method.
- 6) Discuss IRR method for making capital budgeting decisions with suitable examples.
- 7) Compare NPV and IRR method of capital budgeting. Which of them is more reliable and why?
- 8) Can bank rate be used as a discount rate? Discuss.
- 9) What is capital rationing? Explain the process of capital rationing with a suitable example.

### Exercises:

- 1) Silver Clouds Limited is considering investment in Project Y which requires Original Investment of ₹ 10,50,000. The project has an additional working capital requirement of ₹ 1,25,000 and generates

Earnings before Depreciation and Taxes (EBDT) during its five years of life as given below:

Year	1	2	3	4	5
EBDT (₹)	4,25,000	5,55,000	4,40,000	5,50,000	4,05,000

The Project Y has a salvage value of ₹ 50,000 and is depreciated using SLM over its 5 years life. The company is subject to tax rate of 30%. Suggest the Silver Clouds Limited as to whether it should accept Project Y if cost of capital is 12% using (i) NPV method, (ii) IRR method.

[(i) Silver Clouds Limited should invest in Project Y as it has positive NPV of ₹ 2,84,938. (ii) Silver Clouds Limited should invest in Project Y as it has IRR of 20.80% which is higher than cost of capital of 12%.]

2) Shuttles Limited is considering investment in Machine Y for replacement of existing Machine X. Machine X has a remaining life of 4 years, book value of ₹ 2,00,000 at present, salvage value of nil. However, Machine X can be sold presently at ₹ 3,00,000. Machine Y cost ₹ 12,00,000 and has a salvage value of ₹ 2,00,000 at the end of its 4 years life. The purchase of Machine Y to replace Machine X will generate an annual cost savings of ₹ 4,00,000 per annum over next 4 years. The company charges depreciation by SLM and is subject to tax rate of 30%. Advise the Shuttles Limited as to whether Machine X be replaced by Machine Y if cost of capital is 12% using (i) NPV method, (ii) IRR method.

[(i) Shuttles Limited should replace Machine X by Machine Y as it will have an incremental NPV of ₹ 2,29,780. (ii) Shuttles Limited should replace Machine X by Machine Y as it has IRR of 22.45% which is higher than cost of capital of 12%.]

3) The project manager of Orbit Limited has calculated the NPV of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
NPV at discount rate of 12% (₹)	4,25,916	3,09,862	2,95,507	3,73,777	4,08,999

The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

[(i) Projects M, X, Y and Z (ii) M]

4) The project manager of Ruby Limited has calculated the IRR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	15.25%	12.29%	13.68%	16.46%	17.24%

The cost of capital is 13% and the company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

[(i) Projects M, X, Y and Z (ii) Z]

- 5) The project manager of Venus Limited has a fixed capital expenditure budget of ₹ 150 lakhs. He has calculated the NPV of four independent financially viable investment projects which requires a total investment of ₹ 210 lakhs. The project manager has summarized the calculated information in the following table:

Projects	Initial Investment (₹ lakhs)	PV of CFAT (₹ lakhs)	NPV (₹ lakhs)
A	45	63.69	18.69
B	75	137.46	62.46
C	60	98.04	38.04
D	30	39.75	9.75

Advise the company about the projects for investment if the projects are (i) indivisible (ii) divisible.

[(i) Project B and C (ii) Project B, C and 1/3<sup>rd</sup> of Project A]

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 8 CAPITAL BUDGETING UNDER RISK AND UNCERTAINTY**

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### **Structure**

- 8.0 Objectives
  - 8.1 Introduction
  - 8.2 Risk Analysis in Capital Budgeting
  - 8.3 Types of Risk
  - 8.4 Conventional Techniques
  - 8.5 Risk Adjusted Discount Rate Method
  - 8.6 Certainty Equivalent Method
  - 8.7 Let Us Sum Up
  - 8.8 Key Words
  - 8.9 Answers to Check Your Progress
  - 8.10 Self - Assessment Questions / Exercise
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### **8.0 OBJECTIVES**

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After studying this unit, you should be able to:

- carry out risk analysis in capital budgeting;
  - discuss the types of risk in capital budgeting decisions;
  - explain conventional techniques of risk analysis in capital budgeting decisions; and
  - describe and use risk adjusted discount rate method and certainty equivalent method.
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### **8.1 INTRODUCTION**

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In Unit-7, you have understood NPV and IRR Method which are two discounted cash flows methods used for making capital budgeting decisions. Moreover, you have also learnt the concept and process of capital rationing in Unit-7. In the present unit, you will understand the types of risk in capital budgeting and do the risk analysis in capital budgeting using the conventional techniques with emphasis on risk adjusted discount rate (RADR) method and certainty equivalent (CE) method.

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### **8.2 RISK ANALYSIS IN CAPITAL BUDGETING**

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The risk is the variability of the actual cash flows from estimated cash flows. The risk is different from uncertainty as risk can be predicted on the basis of past data while uncertainty cannot be predicted. The acceptance of risky

projects adversely affects the market value of the firm. Thus, other things being equal, a firm should accept less risky projects.

The various investment projects differ from each other in terms of their riskiness. For instance, decision of investment in Government securities is risk-free, introducing a new product in an existing market is risky, and introducing a new product in a new market is even more risky. In capital budgeting decision, the cash inflows of a project are realized in future and the future is uncertain. The estimated cash inflows at the time of investment may differ from the actual cash flows realized due to various types of risks. Thus it becomes necessary for the firm to analyze and incorporate the risk while making capital budgeting decision.

### 8.3 TYPES OF RISK

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The various types of risk in capital budgeting decisions are as follows:

- i) **Project Specific Risk:** The variability of cash flows due to factors specific to that project only is referred as project specific risk. The project specific risk occurs due to wrong assumptions about the cash flows of an investment project. For instance, discontinuation of Tata Nano car is an example of project specific risk as Tata Motors was not able to properly estimate the cash flows associated with it.
- ii) **Competition Risk:** The variability of cash flows due to actions of competitors different from estimated is known as competition risk. For instance, due to popularity of various e-commerce companies the traditional retail stores are facing significant competition risk.
- iii) **Industry Specific Risk:** The variability of the cash flows due to factors such as innovations, changes in technology and material cost etc. that are specific to the industry to which the project relates is known as industry specific risk. For example, presently automobile industry in India is facing significant fall in demand of the products and hence project that relates to investment for introducing a new car is presently subject to industry specific risk.
- iv) **Market Risk:** The variability of cash flows due to factors such as domestic political instability, changes in monetary and fiscal policies etc. that affect all the projects and all the companies is known as market risk. For instance, increase in interest rate affect all the projects and all the companies and make many projects unviable which were selected prior to increase in interest rate.
- v) **International Risk:** The variability of the cash flows due to international factors such as changes in the foreign currency rates or foreign policy changes is known as international risk. For instance, project that significantly earns its revenue from exports is subject to international risk due to depreciating Indian currency at present.

## 8.4 CONVENTIONAL TECHNIQUES

The conventional techniques of risk analysis in capital budgeting decision include Pay Back Period (PBP) method, Risk Adjusted Discount Rate (RADR) method and Certainty Equivalent (CE) method. You have already understood the PBP method in unit-6 which emphasizes on selection of projects with shorter PBP than predetermined PBP to consider risk of an investment project. The PBP method emphasizes liquidity, considers cash flows and the riskiness of an investment project. However, it suffers from the limitation of ignoring project useful life, residual value, cash flows after PBP and time value of money.

The RADR method uses Risk Adjusted Discount Rate RADR while CE method uses the Certainty Equivalents for incorporating risk in capital budgeting decision. You will learn RADR method and CE method in section 8.5 and 8.6 respectively of the present unit. Apart from above mentioned conventional techniques, you can also do the risk analysis in capital budgeting using non conventional techniques such as sensitivity analysis, discounted cash flow, break even analysis, scenario analysis, standard deviation, coefficient of variation, probability distribution approach, simulation analysis and decision tree approach.

### Check Your Progress A

**1) Fill in the blanks with appropriate word.**

- i) The acceptance of risky projects \_\_\_\_\_ affects the market value of the firm.
- ii) The other things being equal a firm should accept \_\_\_\_\_ risky projects.
- iii) The discontinuation of Tata Nano car is due to \_\_\_\_\_ risk.
- iv) Due to increasing popularity of e-commerce companies, the traditional retail stores are facing \_\_\_\_\_ risk.
- v) The variability of the cash flows due to monetary policy changes is an example of \_\_\_\_\_ risk.
- vi) The PBP method is a \_\_\_\_\_ technique of risk analysis in capital budgeting.

**2) State whether the following statements are True or False.**

- i) The risk is variability of actual cash flows from estimated cash flows.
- ii) The uncertainty can be predicted but risk cannot be predicted.
- iii) The capital budgeting decision is subject to project specific risk only.
- iv) The variability of the cash flows due to technological changes is an example of industry specific risk.

- v) The variability of cash flows due to foreign exchange rates changes is an example of market risk.
- vi) The probability distribution approach is a conventional technique of handling risk in capital budgeting.

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## **8.5 RISK ADJUSTED DISCOUNT RATE METHOD**

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The Risk Adjusted Discount Rate (RADR) method accounts for the risk inherent in an investment project by discounting its cash flows at RADR. The RADR is obtained by adding the risk premium rate of an investment project to the risk free rate. For instance, if risk free rate is 7% and risk premium rate of a project is 5% throughout its life then the estimated cash flows of the project are discounted at RADR of 12%. The investment projects vary in terms of their riskiness and hence the cash flows of more risky projects are discounted at higher RADR by adding a higher risk premium. Moreover, risk of an investment project may increase with time. Thus, the cash flows of a project are discounted at higher RADR in later years due to increase in risk with time.

You can use RADR with both NPV and IRR methods. While using NPV method, you can accept a project having positive NPV computed on the basis of RADR. If you want to choose among mutually exclusive projects then you must accept the one having largest NPV among the projects having positive NPV computed on the basis of RADR. While using IRR method, you can accept a project having IRR higher than RADR. If you want to choose among mutually exclusive projects then you must accept the one having largest difference of IRR over RADR among the projects having IRR greater than RADR.

The RADR method has the following merits:

- i) The RADR method is simple to understand and use.
- ii) The RADR accounts for both time and risk preference of investors.

The RADR method suffers from the following demerits:

- i) The subjectivity is involved in determination of risk premium rate.
- ii) This method assumes that the risk increases with time which may not necessarily true.
- iii) This method assumes that investors are risk averse and hence this method is not suitable for risk seekers who do not require additional risk premium for taking higher risk.
- iv) This method adjusts discount rate to incorporate riskiness instead of cash flows which are subject to risk.

Now, let us look at the Illustration 1, 2 and 3 to learn better and use RADR method.

**Illustration 1:** Gem Limited is considering investment in Project X which requires Original Investment of ₹ 6 lakhs and generates CFAT during its eight years life as given below:

Year	1	2	3	4	5	6	7	8
CFAT (₹)	1,14,000	1,35,000	1,07,000	1,14,000	1,31,500	1,42,000	1,45,500	1,67,500

Using NPV method, suggest the Gem Limited as to whether it should invest in Project X if risk free rate is 8% and (i) risk premium rate for project X is 4% throughout its life, (ii) risk premium rate for project X is 4% for first year which increases by 1% in every subsequent year during its life.

**Solution:** (i) First compute RADR by adding risk premium rate for project X of 4% to risk free rate of 8%. Thus, you get RADR of 12% ( $8\%+4\%=12\%$ ). Now, compute NPV of Project X by discounting cash flows at RADR of 12% as given in the following table:

Year	Cash Flows After Tax (CFAT) (₹) (1)	PVF at RADR of 12% (2)	PV of CFAT (₹) (3)=(1)(2)
1	1,14,000	0.893	1,01,802
2	1,35,000	0.797	1,07,595
3	1,07,000	0.712	76,184
4	1,14,000	0.636	72,504
5	1,31,500	0.567	74,561
6	1,42,000	0.507	71,994
7	1,45,500	0.452	65,766
8	1,67,500	0.404	67,670
<b>Total PV of CFAT</b>			6,38,076
<b>Less Original Investment in Project X</b>			6,00,000
<b>NPV of Project X</b>			<b>38,076</b>

You can clearly see from the above table that the Project X has a positive NPV of ₹ 38,076 at RADR of 12% and hence you can advise Gem Limited to invest in Project X.

ii) Compute NPV of Project X by discounting cash flows at RADRs as given in the following table:

Year	CFAT (₹) (1)	RADRs (2)	PVF at RADRs (3)	PV of CFAT (₹) (4)=(1)(3)
1	1,14,000	8%+4%=12%	0.893	1,01,802
2	1,35,000	8%+5%=13%	0.783	1,05,705

3	1,07,000	8%+6%=14%	0.675	72,225
4	1,14,000	8%+7%=15%	0.572	65,208
5	1,31,500	8%+8%=16%	0.476	62,594
6	1,42,000	8%+9%=17%	0.390	55,380
7	1,45,500	8%+10%=18%	0.314	45,687
8	1,67,500	8%+11%=19%	0.249	41,708
<b>Total PV of CFAT</b>				5,50,309
<b>Less Original Investment in Project X</b>				6,00,000
<b>NPV of Project X</b>				<b>-49,691</b>

You can clearly see from the above table that the Project X has a negative NPV of ₹ 49,691 at RADRs computed in column (2) of above table and hence you can advise Gem Limited not to invest in Project X.

**Illustration 2:** Galaxy Limited is considering investment in Project M or Project N which requires original Investment of ₹ 6 lakhs each and generate CFAT during five years life as given below:

Year	1	2	3	4	5
<b>Project M CFAT (₹)</b>	1,50,000	1,75,000	2,25,000	1,75,000	1,50,000
<b>Project N CFAT (₹)</b>	1,75,000	2,25,000	2,75,000	2,25,000	1,75,000

Using NPV method, suggest Galaxy Limited as to whether it should invest in Project M or Project N if the risk free discount rate is 6% and risk premium rate for Project M and Project N are 5% and 10% respectively.

**Solution:** First compute RADR by adding risk premium rate to risk free rate for both Project M and Project N. Thus, you get RADR of 11% (6%+5%=11%) for Project M and 16% (6%+10%=16%) for Project N. Now, compute NPV of Project M and Project N by discounting cash flows at RADR of 11% and 16% respectively as given below:

Year	Project M			Project N		
	CFAT (₹)	PVF at RADR of 11%	PV of CFAT (₹)	CFAT (₹)	PVF at RADR of 16%	PV of CFAT (₹)
1	1,50,000	0.901	1,35,150	1,75,000	0.862	1,50,850
2	1,75,000	0.812	1,42,100	2,25,000	0.743	1,67,175
3	2,25,000	0.731	1,64,475	2,75,000	0.641	1,76,275
4	1,75,000	0.659	1,15,325	2,25,000	0.552	1,24,200
5	1,50,000	0.593	88,950	1,75,000	0.476	83,300
	<b>Total PV of CFAT (₹)</b>	<b>6,46,000</b>		<b>Total PV of CFAT (₹)</b>	<b>7,01,800</b>	
	<b>Less Original Investment in</b>	<b>6,00,000</b>		<b>Less Original Investment in</b>	<b>6,00,000</b>	

	Project M (₹)		Project N (₹)	
	NPV of Project M (₹)	46,000	NPV of Project N (₹)	1,01,800

You can clearly see from the above table that the Project N has a higher NPV of ₹ 1,01,800 as compared to NPV of Project M of ₹ 46,000 and hence you can advise Galaxy Limited to invest in Project N.

**Illustration 3:** The project manager of Emerald Limited has calculated the IRR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	12.25%	15%	16.75%	14.20%	13.45

The risk free rate is 5% and the risk premium rate are 6%, 7%, 8%, 9% and 10% respectively for Projects M, W, X, Y and Z. The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

### Solution

- i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project IRR is more than RADR.

You can easily compute the RADR of Projects M, W, X, Y and Z as 11% ( $5\%+6\% = 11\%$ ), 12% ( $5\%+7\% = 12\%$ ), 13% ( $5\%+8\% = 13\%$ ), 14% ( $5\%+9\% = 14\%$ ) and 15% ( $5\%+10\% = 15\%$ ) respectively by adding risk free rate to risk premium rate.

You can clearly see that the Projects M ( $12.25\% > 11\%$ ), W ( $15\% > 12\%$ ), X ( $16.75\% > 13\%$ ) and Y ( $14.20\% > 14\%$ ) have IRR more than RADR. However, IRR of Project Z ( $13.45\% < 15\%$ ) is less than RADR. Thus, you can advise the company to invest in Projects M, W, X and Y.

- iii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the largest difference of IRR over RADR among the projects with IRR greater than RADR. You have already observed that the Projects M, W, X and Y have IRR greater than RADR. The difference of IRR over RADR is 1.25% ( $12.25\% - 11\%$ ), 3% ( $15\% - 12\%$ ), 3.75% ( $16.75\% - 13\%$ ) and 0.2% ( $14.20\% - 14\%$ ) for projects M, W, X and Y respectively. The Project X has largest difference of IRR over RADR among these projects. Thus, you can advise the company to invest only in Project X.

## Check Your Progress B

### 1) Fill in the blanks with appropriate word.

- i) The RADR is obtained by adding \_\_\_\_\_ of an investment project to \_\_\_\_\_.
- ii) The cash flows of more risky projects are discounted at \_\_\_\_\_ RADR by adding a \_\_\_\_\_ risk premium.
- iii) Using IRR method, you can accept a project having IRR \_\_\_\_\_ than RADR.
- iv) This RADR method assumes that the risk \_\_\_\_\_ with time.
- v) The RADR method adjusts \_\_\_\_\_ to incorporate riskiness instead of \_\_\_\_\_ which are subject to risk.
- vi) If risk free rate for a project is 4% and its risk premium rate is 11% then RADR is \_\_\_\_\_.

### 2) State whether the following statements are True or False.

- i) The RADR accounts only for risk preference of investors.
- ii) The cash flows of a project are discounted at lower RADR in later years due to increase in risk with time.
- iii) Using NPV method, you can accept a project having positive NPV computed on the basis of RADR.
- iv) The RADR method is complex.
- v) The risk premium rate is objectively determined.
- vi) The RADR method is suitable for investors seeking higher risk.

## 8.6 CERTAINTY EQUIVALENT METHOD

The Certainty Equivalent (CE) method incorporates the risk element in an investment project through converting the expected cash flows into certain cash flows by multiplying each of the expected cash flows with certainty equivalent coefficient (CEC). The CEC is ratio of risk free cash flows to risky cash flows. For instance, if risk-free cash flows of an investment project for first year is ₹ 10 lakhs while its risky cash flows are ₹ 15 lakhs for the same period then the CEC is 0.67 (10/15). The CEC lies between 0 and 1 and is inversely related to risk associated with expected cash flows.

You can use CE method with both NPV and IRR methods. While using NPV method, you can accept a project having positive NPV computed on the basis of discounting the certain cash flows of the project at risk free discount rate. If you want to choose among mutually exclusive projects then you must accept the one having largest NPV among the projects having positive NPV computed on the basis of discounting the certain cash flows of the project at risk free discount rate. While using IRR method, you can accept a project having IRR computed on the basis of certain cash flows higher than risk free

discount rate. If you want to choose among mutually exclusive projects then you must accept the one having largest IRR among the projects having IRR computed on the basis of certain cash flows greater than risk free discount rate.

The CE method has following merits:

- i) The CE method is simple to understand and use.
- ii) The CE method incorporates the risk element in an investment project by modifying the expected cash flows which are subject to risk. Thus, this method is superior to RADR method.
- iii) This method does not assume that the risk increases with time.

The CE method suffers from the following demerits:

- i) The subjectivity is involved in determination of CECs which depend on the management perception of riskiness of expected cash flows.
- ii) The forecaster may inflate the expected cash flows of an investment project as they know that the expected cash flows will be converted into certain cash flows by multiplying with CECs.

Now, let us look at the Illustration 4, 5 and 6 to better learn and use CE method.

**Illustration 4:** Using information from Illustration 1, suggest Gem Limited as to whether it should invest in Project X if CECs are as given below:

Year	1	2	3	4	5	6	7	8
CEC	0.95	0.90	0.80	0.70	0.65	0.60	0.55	0.50

**Solution:** Compute the NPV of Project X as given in the following table:

Year	CFAT (₹) (1)	CECs (2)	Certain CFAT (3)=(1)(2)	PVF at 8% (4)	PV of Certain CFAT (₹) (5)=(3)(4)
1	1,14,000	0.95	1,08,300	0.926	1,00,286
2	1,35,000	0.90	1,21,500	0.857	1,04,126
3	1,07,000	0.80	85,600	0.794	67,966
4	1,14,000	0.70	79,800	0.735	58,653
5	1,31,500	0.65	85,475	0.681	58,208
6	1,42,000	0.60	85,200	0.630	53,676
7	1,45,500	0.55	80,025	0.583	46,655
8	1,67,500	0.50	83,750	0.540	45,225
<b>Total PV of CFAT</b>					5,34,795
<b>Less Original Investment in Project X</b>					6,00,000
<b>NPV of Project X</b>					(65,205)

You can clearly see from the above table that the Project X has a negative NPV of ₹ 65,205 and hence you can advise Gem Limited not to invest in Project X. Moreover, the answer would remain same in both part (i) and (ii) as the risk premium rate is ignored in CE method.

**Illustration 5:** Using information from Illustration 2, suggest Galaxy Limited as to whether it should consider Project M or N if their CECs are given below:

Year	1	2	3	4	5
<b>Project M, CECs</b>	0.95	0.90	0.85	0.80	0.70
<b>Project N, CECs</b>	0.90	0.80	0.70	0.65	0.60

**Solution:** Compute the NPV of Project M as given in the following table:

Year	CFAT (₹) (1)	CECs (2)	Certain CFAT (3)=(1)(2)	PVF at 6% (4)	PV of Certain CFAT (₹) (5)=(3)(4)
1	1,50,000	0.95	1,42,500	0.943	1,34,378
2	1,75,000	0.90	1,57,500	0.890	1,40,175
3	2,25,000	0.85	1,91,250	0.840	1,60,650
4	1,75,000	0.80	1,40,000	0.792	1,10,880
5	1,50,000	0.70	1,05,000	0.747	78,435
<b>Total PV of Certain CFAT</b>					6,24,518
<b>Less Original Investment in Project M</b>					6,00,000
<b>NPV of Project M</b>					<b>24,518</b>

Compute the NPV of Project N as given in the following table:

Year	CFAT (₹) (1)	CECs (2)	Certain CFAT (3)=(1)(2)	PVF at 6% (4)	PV of Certain CFAT (₹) (5)=(3)(4)
1	1,75,000	0.90	1,57,500	0.943	1,48,523
2	2,25,000	0.80	1,80,000	0.890	1,60,200
3	2,75,000	0.70	1,92,500	0.840	1,61,700
4	2,25,000	0.65	1,46,250	0.792	1,15,830
5	1,75,000	0.60	1,05,000	0.747	78,435
<b>Total PV of Certain CFAT</b>					6,64,688
<b>Less Original Investment in Project N</b>					6,00,000
<b>NPV of Project N</b>					<b>64,688</b>

You can clearly see from the above table that the Project N has a higher NPV of ₹ 64,688 as compared to NPV of Project M of ₹ 24,518 and hence you can advise Galaxy Limited to invest in Project N.

**Illustration 6:** The project manager of Gem Limited has calculated the IRR on the basis of certain cash flows of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	7.25%	6%	6.75%	6.25%	3.45%

The risk free discount rate is 5% and the company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

### Solution

- i) For the independent projects, the company with no restrictions on funds can accept as many projects as possible provided that the project IRR calculated on the basis of certain cash flows is more than risk free discount rate. You can clearly see that the Projects M ( $7.25\% > 5\%$ ), W ( $6\% > 5\%$ ), X ( $6.75\% > 5\%$ ) and Y ( $6.25\% > 5\%$ ) have IRR calculated on the basis of certain cash flows more than risk free discount rate. However, IRR calculated on the basis of certain cash flows of Project Z ( $3.45\% < 5\%$ ) is less than risk free discount rate. Thus, you can advise the company to invest in Projects M, W, X and Y.
- ii) Although the company has no restrictions on funds for investment, yet for mutually exclusive projects, it can invest only in the project that has the largest IRR among the projects with IRR calculated on the basis of certain cash flows greater than risk free discount rate. You have already observed that the Projects M, W, X and Y have IRR calculated on the basis of certain cash flows greater than risk free discount rate. Project M has largest IRR of 7.25% among these projects. Thus, you can advise the company to invest only in Project M.

### Check Your Progress C

#### 1) Fill in the blanks with appropriate word.

- i) The CEC is the ratio of \_\_\_\_\_ to \_\_\_\_\_.
- ii) The CEC lies between \_\_\_\_\_ and \_\_\_\_\_.
- iii) Under CE method NPV is computed by discounting the \_\_\_\_\_ of the project at \_\_\_\_\_.
- iv) The CE method incorporates the risk element in an investment project by modifying the \_\_\_\_\_.
- v) The CE method does not assume that the risk \_\_\_\_\_ with time.
- vi) The forecaster may \_\_\_\_\_ the expected cash flows under CE method.
- vii) If the risk free cash flows of an investment project for first year is ₹ 20 lakhs while its risky cash flows are ₹ 30 lakhs for the same period then the CEC is \_\_\_\_\_.

#### 2) State whether the following statements are True or False.

- i) The expected cash flows are converted into certain cash flows by dividing each of expected cash flows with CEC.
- ii) The CEC is positively related to risk associated with expected cash flows.
- iii) Under CE method using IRR a project is accepted when having IRR computed on the basis of certain cash flows higher than risk free discount rate.
- iv) The CE method is inferior to RADR method.
- v) The CEC can be negative.

## 8.7 LET US SUM UP

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The risk is the variability of the actual cash flows from estimated cash flows. The other things being equal a firm should accept less risky projects for shareholders wealth maximization. The capital budgeting decision is subject to various risks such as project specific risk, competition risk, industry specific risk, market risk and international risk. The conventional techniques of risk analysis in capital budgeting decision include PBP method, RADR method and CE method. The PBP method emphasizes on selection of projects with shorter PBP than predetermined PBP so as to account for risk of an investment project.

The RADR method uses the RADR for incorporating risk in capital budgeting decision. While using RADR with NPV method, you can accept a project having positive NPV computed on the basis of RADR. While using IRR method, you can accept a project having IRR higher than RADR. The RADR method is simple and accounts for both- time and risk preference of investors. However, RADR method suffers from the limitations of adjusting discount rate rather than cash flows which are subject to risk and subjectivity in estimation of risk premium rate. Moreover, RADR method is not suitable for investors who are risk seekers and for projects where risk does not increase with time.

The CE method uses the CE coefficients for incorporating risk in capital budgeting decision. While using CEC with NPV method, you can accept a project having positive NPV computed on the basis of discounting the certain cash flows of the project at risk free discount rate. While using IRR method, you can accept a project having IRR computed on the basis of certain cash flows higher than risk free discount rate. The CE method is simple, adjusts the right element for risk i.e. the cash flows and does not assume that risk increases with time. However, CE method suffers from the limitations of subjectivity in determination of CEC and inflated estimation of cash flows by the management.

## 8.8 KEY WORDS

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**Risk:** The variability of the actual cash flows from estimated cash flows.

**RADR:** Calculated by adding the risk premium rate of an investment project to the risk free rate.

**CE Coefficients:** The ratio of risk free cash flows to risky cash flows.

## 8.9 ANSWERS TO CHECK YOUR PROGRESS

- A) 1 (i) adversely (ii) less (iii) project specific (iv) competition (v) market (vi) conventional  
2 (i) True (ii) False (iii) False (iv) True (v) False (vi) False
- B) 1 (i) risk premium rate, the risk free rate (ii) higher, higher (iii) higher (iv) increases (v) discount rate, cash flows (vi) 15%  
2 (i) False (ii) False (iii) True (iv) False (v) False (vi) False
- C) 1 (i) risk free cash flows, risky cash flows (ii) 0, 1 (iii) certain cash flows, risk free discount rate (iv) expected cash flows (v) increases (vi) inflate (vii) 0.67  
2 (i) False (ii) False (iii) True (iv) False (vi) False

## 8.10 SELF-ASSESSMENT QUESTIONS/EXERCISES

### Questions:

- 1) What do you mean by risk? Why the risk analysis is needed while making capital budgeting decisions?
- 2) Discuss with suitable examples the various types of risks involved in capital budgeting decisions.
- 3) What is RADR method? State its merits and demerits.
- 4) Illustrate the RADR method for incorporating risk in capital budgeting decisions.
- 5) What is CEC method? State its merits and demerits.
- 6) Illustrate the CEC method for incorporating risk in capital budgeting decisions.

### Exercises:

- 1) Venus Limited is considering investment in Project X which requires Original Investment of ₹ 6 lakhs and generates CFAT during its five years life as given below:

Year	1	2	3	4	5
CFAT (₹)	1,50,000	1,75,000	2,25,000	1,75,000	1,50,000

Using NPV method, suggest the Venus Limited as to whether it should invest in Project X if risk free rate is 5% and (i) risk premium rate for project X is 6% throughout its life, (ii) risk premium rate for project X is 6% for first year which increases by 1% in every subsequent year during its life.

[(i) Venus Limited should invest in Project X as it has positive NPV of (i) ₹ 46,000 (ii) ₹ 8,700]

- 2) Mercury Limited is considering investment in Project M or N which require Original Investment of ₹ 12 lakhs each and generate CFAT during five years life as given below:

Year	1	2	3	4	5
<b>Project M CFAT (lakhs of ₹)</b>	3	3.5	4.5	3.5	3
<b>Project N CFAT (lakhs of ₹)</b>	3	4.5	5.5	4.5	3

Using NPV method, suggest Mercury Limited as to whether it should consider Project M or N if the risk free discount rate is 6% and risk premium rate for Project M and Project N are 5% and 10% respectively.

[Mercury Limited should invest in Project N which has a higher NPV of ₹ 1,36,700 as compared to NPV of Project M of ₹ 92,000]

- 3) The project manager of Ruby Limited has calculated the IRR of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	15.25%	11.29%	13.68%	16.46%	17.24%

The risk free rate is 5% and the risk premium rate are 6%, 7%, 8%, 9% and 10% respectively for Projects M, W, X, Y and Z. The company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

[(i) All the Projects M, X, Y and Z (ii) M]

- 4) Using information from Exercise (1) above, suggest the Venus Limited as to whether it should invest in Project X if CECs are as given below:

Year	1	2	3	4	5
CECs	0.95	0.90	0.85	0.80	0.70

[(i) Venus Limited should invest in Project X as it has positive NPV of ₹ 41,293, answer would remain same in both part (i) and (ii) as the risk premium rate is ignored in CE method.]

- 5) Using information from Exercise (2) above, suggest Mercury Limited as to whether it should consider Project M or N if their CECs are as given below:

Year	1	2	3	4	5
<b>Project M, CECs</b>	0.95	0.90	0.85	0.80	0.70
<b>Project N, CECs</b>	0.90	0.80	0.70	0.65	0.60

[Mercury Limited should invest in Project N which has a higher NPV of ₹ 64,530 as compared to NPV of Project M of ₹ 49,035.]

- 6) The project manager of Rose Limited has calculated the IRR on the basis of certain cash flows of five Projects under consideration as given below:

Projects	M	W	X	Y	Z
IRR	4.5%	6.25%	6.75%	6.50%	7.80%

The risk free discount rate is 6% and company has no restrictions on the funds for investment. Advise the company about the projects for investment if the projects are (i) independent (ii) mutually exclusive.

[(i) All the Projects W, X, Y and Z (ii) Z]

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

## **BLOCK 3**

## **FINANCING DECISIONS**

## **BLOCK 3 FINANCING DECISIONS**

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Every business wants to earn revenue and the revenue should be so much that it should meet its cost of capital. Hence, the cost of capital is an important factor in financial decisions. Capital structure decision is to determine the relative proportion of equity and debt. It is significant financial decision because it affects the share holders return and risk and as a result the market value of shares. Leverage analysis is the technique which is used to quantify risk return relationship of different alternatives of capital structure. Securities provide the return in the form of dividends or interests and also provides a return at the time of sale. These securities have to be valued at different points of time and the value varies according to risk perception and estimation.

This Block discusses these concepts. It contains four units:

**Unit 9 - Cost of Capital:** It explains the meaning, importance, classification of cost of capital. It further explains how to calculate cost of equity capital, cost of preference share capital, cost of retained earnings, cost of debt, weighted average cost of capital and weighted marginal cost of capital.

**Unit 10 - Valuation of Securities:** It explains the basic valuation model and bond valuation. It also explains valuation of equity shares, preference shares and valuation of convertible debentures.

**Unit 11 - Capital Structure Decision:** It discusses capital structure, determinants of capital structure and optimal capital structure. It further explains net income approach, net operating income approach, traditional approach and M & M hypothesis.

**Unit 12 - Leverage: Operating, financial and combined:** It explains the concept of leverage, meaning, calculation and significance of operating leverage, financial leverage and combined leverage.

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# **UNIT 9 COST OF CAPITAL**

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## **Structure**

- 9.0 Objectives
  - 9.1 Introduction
  - 9.2 Meaning
  - 9.3 Significance of Cost of Capital
  - 9.4 Types of Cost of Capital
  - 9.5 Factors affecting Cost of capital
  - 9.6 Cost of Equity Share Capital
  - 9.7 Cost of Preference Share capital
  - 9.8 Cost of Debentures
  - 9.9 Cost of Retained Earnings
  - 9.10 Weighted Average Cost of Capital
  - 9.11 Weighted Marginal Cost of Capital
  - 9.12 Some Illustrations
  - 9.13 Let Us Sum Up
  - 9.14 Key Words
  - 9.15 Self-Assessment Questions/Exercises
- 

## **9.0 OBJECTIVES**

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After studying this unit, you should be able to:

- explain the concept and relevance of cost of capital for financial decision making;
  - explain the different types of cost of capital;
  - discuss the various factors affecting the cost of capital of a firm;
  - understand and calculate the specific costs of capital- equity share capital, preference share capital, debentures and retained earnings; and
  - understand the concept and calculate the weighted average cost of capital and weighted marginal cost of capital of the firm.
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## **9.1 INTRODUCTION**

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The cost of capital is an essential input for making financial decisions. Investors who invest in corporate through bonds, preference stocks and common stocks requires a minimum rate of return on their investment because they take risk in investing in the firms. These groups provide the capital needed to finance a firm's investments.

The cost of capital is the minimum required rate of return a firm must earn in order to cover the cost of raising funds being used by the firm. When these investors provide funds to the firm, they expect a minimum return from the firm. This minimum return expected by the investor depends on the risk perception of investors and the risk– return characteristics of the firm. Thus, the firm must earn the minimum return to pay the investors, so the cost of capital is the minimum rate that a firm must earn to meet the expectations of its investor. In this unit, you will learn about the meaning, types and significance of the cost of capital and also learn how to calculate the cost of equity capital, preference share capital, debentures, retained earnings, weighted average cost of capital and weighted average marginal cost of capital.

## **9.2 MEANING**

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You know that for those who invest in the business for them the rate of return on a security is the benefit of investing and for the firm this rate of return is the cost of raising funds that are required to operate the firm. In simple words, we can say that the cost of raising funds is the firm's cost of capital.

Some important definitions are as under:

**According to James C. Van Horne**, Cost of capital is “A cut-off rate for the allocation of capital to the investment of projects. It is the rate of return on a project that will leave un-changed the market price of the stock”.

**According to William and Donaldson**, “Cost of capital may be defined as the rate that must be earned on the net proceeds to provide the cost elements of the burden at the time they are due”.

### **Assumptions of cost of capital**

- 1) It is a hurdle rate or rate of return and is not a cost as such.
- 2) It is the minimum rate of return that will result in at least maintaining the value of the equity shares.
- 3) It is related to long-term capital funds.
- 4) It consists of three important risks such as zero risk level (ro), business risk (b), and financial risk (f).

Thus cost of capital (k) can be calculated as:

$$k = ro + b + f$$

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## **9.3 SIGNIFICANCE OF COST OF CAPITAL**

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The following points highlight the significance of cost of capital:

- **Capital budgeting decisions:** The acceptance or rejection of the project is decided taking into consideration the cost of capital. Here the present values for the estimated benefits from the available investment opportunities are calculated by discounting them using a relevant cost of capital.

- **Capital structure decisions:** Different sources of funds have distinct features, few are cheaper in comparison to others, or some are easily available. A firm uses both debt and equity mix for designing its capital structure. Thus, for determining optimum capital structure we choose the debt and equity capital mix for which the cost of capital is minimum.
- **Evaluating financial performance:** A firm having a high cost of capital is exposed to high risk and it also adversely impacts the profitability. The profitability of the project is compared to the overall cost of capital and if it is more than the performance is said to be satisfactory.
- **Other financial decisions:** Cost of capital is also seen to have an important role in other fields such as to find the value of shares, earning power of shares, for taking other financial decisions such as dividend policy decisions, working capital decisions etc. The cost of capital, thus, forms the basis for various decisions and as a result, it plays a crucial role in financial accounting.

## 9.4 TYPES OF COST OF CAPITAL

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Cost of capital may be broadly classified into the following:

- **Explicit cost and Implicit cost:** Explicit cost of any source of capital is one which is stated and firm has to pay it for procuring the finance. The interest payment on debt and dividend payment on equity capital are examples of explicit cost of capital for raising funds through debentures.

On the other hand, the implicit cost of any source of fund is like the opportunity cost. An example of implicit cost is retained earnings where its cost is the opportunity cost which is equal to the earnings forgone by the shareholders.

- **Future cost and Historical cost:** Future cost may be defined as the expected cost of financing a project. These costs are an important consideration while deciding any future financial investments and hence, are relevant for financial decision making.

On the other hand, historical cost is the cost that has already been incurred. These costs are also very useful for calculating the projected future cost and are also used for making a comparison between actual and projected costs.

- **Specific cost and Combined cost:** The cost of an individual or each source of finance is called specific cost like cost of equity, cost of preference shares, cost of debentures or cost of retained earnings.

When we combine all the individual and specific costs of finance together, we get combined cost. It is used to calculate the overall cost incurred for financing a project when more than one source of finance is used to raise the capital.

- **Average cost and Marginal costs:** The average cost is calculated as the weighted average of the costs of each source of funds employed by the firm. The weights are the proportions of the share of each component of

capital to the total capital structure. The capital structure comprises of different sources of borrowed funds and owned funds such as debentures, preference shares capital, equity share capital and retained earnings.

Marginal cost, on the other hand, is an incremental cost. It is the incremental or differential cost of capital of the additional finance raised by a firm. It is an important concept in financial management for making capital budgeting decisions.

### Check your progress A

- 1) Explain the concept of cost of capital.

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- 2) How is explicit cost different from implicit cost?

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- 3) What are specific cost and combined cost of capital?

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## 9.5 FACTORS AFFECTING COST OF CAPITAL

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- 1) **Risk-free interest rate:** Risk-free interest rate is the interest rate which is on risk-free securities, for example securities of government of India which are default and risk-free. The risk free interest rate depends on supply and demand consideration in financial market for long term funds. The market sources of demand and supply consists of two components:
- a) **Real interest rate:** The interest rate payable to lender for surrendering the funds for a period.
  - b) **Purchasing power risk premium:** when an investor commits his funds for investment, he sacrifices his present purchasing power. When the investor receives back his money, it is possible that during that period prices have increased and his purchasing power has reduced.

An investor likes to maintain his purchasing power and wants to get compensation for the loss in purchasing power for the period in which he supplies funds, so with real interest rate, purchasing power risk premium is added in analyzing the risk-free interest rate. Purchasing power risk premium is directly related to rate of inflation and hence, when rate of inflation increases, the purchasing power risk premium also increases and risk-free rate of interest goes high.

- 2) **Business Risk:** It can be defined as chances of occurrence of any unfavorable event that has ability to minimize gain and maximize loss in the business. No business can completely avoid risk although the degree of risk may differ from one business to another depending upon the type and nature of business. The various factors influencing the business risk may include economic climate, government regulations, per unit pricing, sales volumes, input cost, competition, environmental factors etc.
- 3) **Financial Risk:** The financial risk is associated with composition and mixing of different sources of finance. It can affect the returns available to the investors, the higher proportion of fixed cost securities in capital structure, the greater would be the financial risk. Investors want to be compensated for the increased risk, so they seek financial risk premium. Thus, risk due to addition of fixed interest-bearing securities is financial risk.

#### Check your Progress B

- 1) What is risk- free interest rate?

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- 2) Explain the concept of business risk.

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- 3) What is financial risk?

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## 9.6 COST OF EQUITY SHARE CAPITAL

Measurement of cost of capital is a complex task as there is no coupon rate and also interest rate is not fixed as in preference shares and debentures. Cost of equity share capital is the rate of discount at which the expected dividends are discounted to determine their present worth.

- 1) **Zero Growth Dividend:** In this case, it is assumed that dividend will remain constant.

$$K_e = D_1/P_0$$

$K_e$  = Cost of equity share capital

$D_1$  = Expected dividend at the end of year

$P_0$  = Current market price of the share( Net Proceeds)

$g$  = growth rate

- 2) **Constant growth rate in dividends:** It is assumed that dividends increase at a constant rate say 'g' percent per annum.

$$K_e = D_1/P_0 + g$$

$$P_0 = \frac{D_0 (1+g)}{K_e - g} \text{ or } K_e = \frac{D_1}{P_0} + g$$

$$P_0 = \frac{D_1}{K_e - g}$$

### Illustration 1:

'A' Ltd. paid a dividend at a rate of 8% on equity share of Rs 100 each, the expected growth rate in dividend is 10%, find out the cost of capital of equity shares if the present market value of the share is Rs. 250.

#### Solution:

$$\begin{aligned} K_e &= D_1/P_0 + g \\ &= 8.8/250 + 10 \\ &= 10.035\% \end{aligned}$$

Here  $D_1 = D_0 (1+g) = 8(1+.10) = 8.88$

### Illustration 2:

'S' Ltd. has issued shares of Rs. 100 value each and dividends is expected at Rs. 8 per share with a growth rate of 10% per annum. It plans to issue new equity share capital, under pricing of Rs. 2 is necessary for pricing the new issue. The cost of Rs. 5 per share is miscellaneous expenses which can be taken as floatation cost. Find out the cost of existing equity shares as well as the new equity provided the dividend rate and growth are not changed.

#### Solution:

Market price = Rs 100, Floating cost = Rs 5 per share under pricing required for new issue = 2, Net proceeds =  $(100 - 5 - 2) = 93$ , Growth rate,  $g = 10\%$

$$D_1 = \text{Rs } 8$$

Cost of existing capital  $K_e = (8/100) + 0.10 = 0.18$  Cost of Capital

$$= (18\%)$$

Cost of capital for fresh equity  $K_n = D_1/N_p + g$

$$= 8/93 + .10 = 18.60\%$$

**Varying Growth Rate in Dividend-** following is the equation considering varying growth rates in dividends-

$$\text{Stock Value} = \frac{D_1}{(r+1)^1} + \frac{D_2}{(r+1)^2} + \frac{D_3}{(r+1)^3} + \dots + \frac{D_N}{(r+1)^N} + \frac{\frac{D_N(1+G_2)+D_NH(G_1-G_2)}{(r-G_2)}}{(r+1)^N}$$

Where  $G_1, G_2$  are the varying growth rates.

### Illustration 3:

AB Ltd. earnings and dividends are growing at a rate of 18%. This growth rate is expected to continue for next 4 years and thereafter growth rate is expected to decline to 5% forever. Calculate the intrinsic value of share if required rate of return is 15% and dividend which has been just paid for last year is Rs. 2.

#### Solution:

$D_0 = \text{Rs. } 2$  (paid at the beginning of current year)

$G_1$  for first four years is 18%

Calculation of dividends and their present value for first 4 years

Year	Dividend $D_0 (1+g) D_n$	PVF (15% n)	PV of dividend
1	$D_1 = 2(1+.18) = 2.36$	.8696	2.05
2	$D_2 = 2(1+.18)^2 = 2.78$	.7561	2.10
3	$D_3 = 2(1+.18)^3 = 3.29$	.6575	2.16
4	$D_4 = 2(1+.18)^4 = 3.88$	.5718	2.22
			8.53

Calculation of Dividend for 5<sup>th</sup> year  $D_5$

$$D_5 = D_4 (1+g)$$

$$= 3.88 (1+0.5) = 4.074$$

We will now calculate the intrinsic price of the shares for the end of year 4 i.e.  $P_4$

$$P_4 = \frac{D_5}{K_e - g} = \frac{4.074}{.15 - 0.5} = 40.74$$

Now present value of 40.74 would be  $40.74 \times .5718$

$$P_4 = 40.74 \times .5718 = 23.295$$

Now intrinsic value of shares at present

$$\begin{aligned} P_0 &= PV \text{ of dividend in 4 years} + PV \text{ of } P_n \\ &= 23.295 + 8.53 = \text{Rs.} 31.825 \end{aligned}$$

### 3) Earning-Price Approach

In this approach, the market price of the equity share depends upon the earnings. Earnings include both dividends and retained earnings whereas dividend approach does not include retained earnings. Under this approach, the cost of capital is calculated using the following formula:

$$K_e = E_0 / P_0$$

$K_e$  = Cost of Equity

$E_0$  = Earnings Per Share

$P_0$  = Net proceeds of an equity

#### Illustration 4:

The current market price of the share of a company is Rs. 100. The company's current earnings are Rs. 10,00,000. Its shares outstanding are 200,000. The company wants to raise additional capital of Rs 800,000. The floatation cost is Rs 10 per share and the company can sell shares at a discount of 10%. Find out the cost of equity considering the company's earnings are stable.

#### Solution:

$$K_e = E_0 / P_0$$

$$E_0 = 10,00,000 / 2,00,000 = \text{Rs.} 5 \text{ per share}$$

$$P_0 - \text{Face value} - \text{Floatation cost} - \text{Discount} = 100 - 10 - 10 = \text{Rs.} 80$$

$$K_e = 5 / 80 = 6.25\%$$

### 4) Capital Asset Pricing Model (CAPM)

Under this method, return on any security depends on the risk level that is attached to the security. The expected return of a security is directly proportional to the risk attached to the security. Hence, the relationship between risk and return is linear. Risk in relation to security investment may be bifurcated into

- **Unsystematic Risk:** It is diversifiable and is caused due to company specific factors such as management of the company, staff unrest, strikes, level of operating and financial leverage of the firm. This part of the total risk is diversifiable
- **Systematic Risk:** It is non-diversifiable and is caused due to macro-environment factors such as changes in demand and supply,

government policy, change in trade policy, inflation, purchasing power etc.

Cost of Capital

In CAPM (developed by Sharpe in 1965), the cost equity is determined based on the risk –free rate, market return and  $\beta$  (beta) which is the symbol of systematic risk.

$$K_e = R_f + \beta (R_m - R_f)$$

$K_e$  = cost of equity

$R_f$  = risk free return

$\beta$  = coefficient of systematic risk

$R_m$  = expected Market return

### Illustration 5:

From the following data given for security A and security B. Calculate the cost of equity using CAPM of security A and security B.

The risk free rate = 8%

Expected return on market portfolio = 15%

$\beta$  of security A = 1.5

$\beta$  of security B = .8

#### Solution:

using the formula-

$$K_e = R_f + \beta (R_m - R_f)$$

Cost of equity of Security A

$$K_e = 8 + 1.5 (15 - 8)$$

$$= 8 + 1.5 (7)$$

$$= 18.5\%$$

Cost of equity of Security B

$$K_e = 8 + .8 (15 - 8)$$

$$= 8 + .8 (7)$$

$$= 13.6\%$$

- 5) **Realised Yield Approach:** While using dividend price ratio and earning price ratio for calculating  $K_e$ , the difficulty is to estimate the rate of expected return. This approach is based on the assumption that actual returns that investors earned in the past will be earned again in the future. The dividends recorded and paid in the past for a particular period should be considered for calculating cost of equity. The most recent 5-10 years are taken and the rate of return is calculated for an investor who purchased the share in the beginning of the study period, held it to the

present and sold at the current price. This is also the realized yield by the investor. This yield is supposed to indicate the cost of equity shares on the assumption that the investor earns what he expects to earn.

This approach has unrealistic assumptions like the risks faced by the companies remain constant; the shareholders continuously expect the same rate of return and the reinvestment rate of the shareholders is same as the realised yield. This approach is best suited for the companies that have good and stable earnings.

#### **Illustration 6:**

Mr. R purchased one share of Beta Limited for Rs, 1000. He received dividend on the same for a period of 5 years at the rate of 10%. At the end of the fifth year, he sold the share of Beta Ltd for Rs. 1128. You are required to compute the cost of equity.

#### **Solution:**

we know that the cost of equity is equal to realised rate of return as per realised yield approach.

Before calculating the cost of equity capital, we have to compute the internal rate of return which can be calculated by trial and error method.

The discount rate that equalizes these two is 12% approximately. This can be seen from the table below:

Year	Dividend	Sale Proceeds	Discount Factor @12%	Present value
1	100	-	.893	89.3
2	100	-	.797	79.7
3	100	-	.712	71.2
4	100	-	.636	63.6
5	100	-	.567	56.7
6	Beginning	1128	.567	639.6
				1000.076

Thus the present value of cash flows is Rs. 1000.76 as against the purchase price of one share which was Rs. 1000, therefore, at 12% present value of cash flow will be equal to out flow over a period of 6 years.

Therefore, the realized rate may be taken as 12% which is also the cost of equity.

- 1) What is earning-price approach?

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- 2) How is systematic risk different from unsystematic risk?

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- 4) Explain realised yield approach of cost of equity capital.

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## **9.7 COST OF PREFERENCE SHARE CAPITAL**

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Preference shares are basically hybrid securities as they have advantage of both debt and equity share capital. Like in debt, the interest is fixed, the preference dividend is also paid at fixed rate. But in case of non-payment of dividend, the preference shareholders cannot call for legal actions against the company as debenture holders can.

For the purpose of calculating overall cost of capital, the calculation of cost of preference share is very important. Dividend received on preference shares is non-tax deductible and hence, not adjusted for taxes. There are two types of preference shares-

- a) Irredeemable Preference Shares

- b) Redeemable Preference Shares

- 1) **Cost of Irredeemable Preference Shares:** These are the preference shares that are not paid till the liquidation of the company. However, Section 55 of the Companies Act 2013 prescribes that a company shall not issue irredeemable preference shares. Further, it also imposes restrictions on companies limited by shares to issue preference shares liable to be redeemed at the end of twenty years.

Cost of Irredeemable Preference Shares is calculated using the following formula-

$$K_p = PD/NP$$

Here

$K_p$  = cost of preference shares

$PD$  = annual preference dividend per share

$NP$  = Net Proceeds

Note In case shares are issued at premium or discount with floatation cost, the net proceeds will be:

Net Proceeds = Face value + Premium – Floatation cost

Net Proceeds = Face Value – Discount – Floatation cost

### Illustration 7:

ABC Ltd. issues 1000, 10% preference shares of Rs 100 each at Rs 95. Calculate the cost of preference shares.

#### Solution:

Using the formula:

$$K_p = PD/NP$$

$$K_p = 10/95 = 10.53\%$$

- 2) **Cost of Redeemable Preference Shares:** These shares are repaid after the expiry of the fixed maturity period. The cost of these shares can be calculated using the following formula:

$$\frac{D + \frac{(MV - NP)}{n}}{\frac{1}{2}(MV + NP)}$$

$D$  = Annual Preference Dividend

$MV$  = Maturity Value of preference share

$NP$  = Net Proceeds

$n$  = life of preference shares

### Illustration 8:

XYZ Ltd. issues 1000, 10% preference shares of Rs 100 each at Rs 95. The company proposes to redeem the shares at the end of 8<sup>th</sup> year from the date of issue. Calculate the cost of preference shares.

#### Solution:

Using the formula-

$$\begin{aligned} & D + \frac{(MV - NP)}{n} \\ &= \frac{D + \frac{(100 - 95)}{8}}{\frac{1}{2}(100 + 95)} \\ &= \frac{10 + (100 - 95)/8}{(100 + 95)/2} \\ &= 10.625/97.5 = 10.90\% \end{aligned}$$

Another important source for raising funds is debt securities. Debt securities carry fixed rate of interest which is allowed as tax deductible expense.

Debentures as defined under Companies Act 2013 include, "debenture bonds, bonds or any other instrument of a company evidencing a debt, whether constituting a charge on assets of the company or not."

In simple words, a debenture is basically the loan that company raises. The person who has bought a debenture and holds it is called a debenture holder. He is the creditor of the company.

### 1) Cost of Irredeemable Debentures

Irredeemable debentures or perpetual bonds have no maturity and they are not redeemed by the company during its lifetime. The cost of irredeemable debenture can be calculated by using the following formula-

$$K_d = \frac{I(1-t)}{NP}$$

Where

$K_d$ = cost of debt capital

I= Interest

t = tax rate

NP = Net Proceeds

Note In case debentures are issued at premium or discount with floatation cost

Net Proceeds = Face value + premium – floatation cost

Net Proceeds= Face Value—Discount – floatation cost

### Illustration 9:

Ram Ltd issues Rs. 100,000, 8% debentures at par. The tax rate applicable for the company is 50%. Find out the cost of debt capital.

### Solution:

Using the formula-

$$K_d = \frac{I(1-t)}{NP}$$
$$= \frac{8,000(1-50)}{1,00,000} = 4\%$$

## 2) Cost of Redeemable Debenture

The debentures that are redeemed by the issuing company at the expiry of the specified period for which it is issued, is called a redeemable debenture. It can be calculated using a short-cut formula

$$K_d = \frac{I(1-t)+(RV-NP)/n}{(RV+NP)/2}$$

Where I= Interest Rate

RV= Redemption Value

NP= Net Proceeds

n = number of years

### Illustration 10:

ABC Ltd issues Rs 100 debentures carrying 10% interest. The debentures are repayable after 5 years at the face value. The cost of issue is 5% and tax rate is 50%. Calculate the cost of debentures.

#### Solution:

$$K_d = \frac{10 + (1-0.50)(100-95)/5}{(100+95)/2}$$

$$= 10.5/97.5 = .10769 = 10.8\%$$

## 9.9 COST OF RETAINED EARNINGS

Many times, a company may not distribute the entire profits to the shareholders in the form of dividends and may retain a portion of the same as retained earnings. These retained earnings are used by the corporate to finance its projects and meet other fund requirements. For this source of finance, the company is not required to pay any explicit cost but it does have an implicit cost. The implicit cost for retained earnings is the opportunity cost of funds not available to the shareholders for investment. Hence, the cost of retained earnings is same as the cost of an equivalent fully subscribed issue of additional shares as measured by the cost of equity capital.

#### Cost of Retained Earnings

$$K_r - K_e (1-t_i)$$

$K_r$ = cost of retained earnings

$K_e$ = cost of equity

$t_i$  tax rate of individual shareholder

### Illustration 11:

The dividend paid by the S Ltd. is 10%. The personal tax rate of individual is 20%. Calculate the cost of retained earnings.

#### Solution:

$$K_r = 10\%(1-0.20) = 8$$

## 9.10 WEIGHTED AVERAGE COST OF CAPITAL

Cost of Capital

It is also called as overall cost of capital or composite cost of capital. It can be defined as an average expected future cost of funds raised from various sources over the long run calculated by weighing the cost of each specific type of capital by its proportion in the firm capital structure.

The formula for calculating the overall cost of capital is-

$$K_0 = K_e W_e + K_p W_p + K_d W_d + K_r W_r$$

$K_0$ = overall cost of capital

$K_e$ = cost of equity capital

$K_p$  = cost of preference share

$K_d$ = cost of debt

$K_r$  = cost of retained earnings

$W_e$ ,  $W_p$ ,  $W_d$ and  $W_r$  are the weights for equity, debt, preference shares and retained earnings respectively.

**Illustration 12:** A company has the following amounts and specific costs of each type of capital on its books

Type of Capital	Book Value	Market Value	Specific cost
Debt	400,000	3,80,000	5
Preference share	100,000	1,10,000	8
Equity	200,000	900,000	15
Retained Earnings	600,000	300,000	13
	13,00,000	16,90,000	

Determine the weighted average cost of capital using

- Book Value weights
- Market value of weights

**Solution:**

Computation of weighted Average cost of capital based on Book Value weights.

Type of Capital	Book Value	Weights	Specific cost	Weights × specific cost
Debt	400,000	.308	5	1.54
Preference share	100,000	.077	8	.616
Equity	200,000	.154	15	2.31
Retained Earnings	600,000	.462	13	6.01
	13,00,000			10.48

### Computation of Weighted Average Cost of Capital based Market Value

Type of Capital	Market Value	Weights	Specific cost	Weights X specific cost
Debt	3,80,000	.225	5	1.125
Preference share	1,10,000	.065	8	.52
Equity	900,000	.533	15	7.995
Retained Earnings	300,000	.178	13	2.314
	16,90,000			11.95

## **9.11 WEIGHTED MARGINAL COST OF CAPITAL**

Many times, a financial Manager needs to know the cost of raising additional funds for financing a project. In such a case, he is required to calculate the marginal cost of capital. In simple words, this marginal cost of capital is the weighted average cost of new capital to be raised which can be calculated using the marginal weights. These marginal weights are the proportions of various sources of funds that will be employed for raising additional funds.

Further, this marginal cost of capital rises as the company raises more and more capital. This is because capital is a scarce resource like any other cost of production. Therefore, when capital investment decisions are taken, a project whose marginal revenue is in excess of the marginal costs should be selected. When decision is taken in consonance with this principle, shareholder's wealth is maximized.

We may understand the weighted marginal cost of capital using following formula-

**WMCC = (proportion of additional fund from source<sub>1</sub> × after –tax cost capital of source<sub>1</sub>) +( proportion of additional fund from source<sub>2</sub> × after –tax cost of capital of source<sub>2</sub>) +.....( proportion of additional funds from source<sub>n</sub> × after- tax cost of capital of source<sub>n</sub>)**

#### **Illustration 13:**

ABC Ltd has the following capital structure and after – tax cost of different sources of funds-

Sources of Funds	Amount (₹)	After- tax costs(%)
Equity	6,50,000	12
Debt	3,00,000	10
Preference Capital	4,50,000	8

- a) Calculate the weighted Cost of Capital using book value weights.
- b) The firm wishes to raise further Rs 5,00,000 for expansion of some projects using the following sources of funds.

Additional source of fund	Additional Funds (₹)	Cost of Capital
Equity	1,50,000	
Preference capital	1,50,000	
Debt	200,000	

Assume the specific costs of capital to remain same.

**Solution:**

**a) computation of Weighted Cost of Capital**

Source (1)	Amount(2) (₹)	Weights(3)	After-tax costs (%) (4)	WCC (3)x (4)
Equity	6,50,000	.465	12	5.58
Debt	3,00,000	.214	10	2.14
Preference	4,50,000	.321	8	2.59
			WCC	
			10.29%	

**b) Computation of weighted Marginal Cost of Capital**

Source (1)	Amount (2) (₹)	Weights(3)	After-tax costs (%) (4)	WMCC
Equity	1,50,000	.30	12	3.6
Debt	200,000	.40	10	4
Preference	1,50,000	.30	8	2.4
			WMCC	
			10%	

**Check Your Progress D**

- 1) What is a preference share?

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- 2) What are redeemable and irredeemable debentures?

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- 3) Explain the concept of retained earnings as a source of finance.

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- 4) What do you understand by weighted average cost of capital?

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- 5) Explain the concept of Weighted Marginal cost of Capital?

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## **9.12 SOME ILLUSTRATIONS**

### **Illustration 1:**

Keenam Ltd. is planning to raise Rs.1 crore by issuing 12% preference shares of Rs. 250 each at 15% discount. The underwriting expenses for the same are expected to be 5%. Find out the cost of preference shares capital in each of the following cases-

- 1) If preference shares are irredeemable
- 2) If preference shares are redeemable at 15% premium after 10 years

### **Solution:**

#### **1) if preference share are irredeemable**

Cost of preference share capital ( $k_p$ )

$$K_p = \frac{PD}{NP}$$

$$NP = (250 - 37.5 - 12.5) = \text{Rs } 200$$

$$PD = 30$$

$$K_p = (\text{Rs } 200 / 30) = 6.67$$

## 2) If preference share are redeemable

Cost of Capital

$$\begin{aligned} K_p &= \frac{PD + (RV - NP)/N}{(RV + NP)/2} \\ &= \frac{30 + (287.5 - 200)10}{(287.5 + 200)/2} \\ &= 0.1590 = 15.90\% \end{aligned}$$

### Illustration 2:

Equity share of P Ltd. is currently priced at Rs. 60. Dividend expected at the end of one year from now is Rs. 6. Cost of equity for companies of similar risk is 18%. Find the expected growth rate.

What will be the new market price of equity share if the growth rate is revised down to 5%?

### Solution:

For  $K_e$  we use the formula

$$K_e = \frac{D_1}{P_0} + g$$

$$.18 = \frac{6}{60} + g$$

$$.18 = \frac{1}{10} + g$$

$$.18 = 1 + 10g$$

$$10g = 1.8 - 1$$

$$g = \frac{.8}{10} = 8\%$$

$$K_e = D_1 + g$$

When  $g$  is revised down to 5%

We need to calculate new  $D_0$  using

$$D_1 = D_0(1+g)$$

$$6 = D_0(1+.05)$$

$$D_0 = \frac{6}{1.05}$$

$$D_0 = 5.71$$

Now calculating revised  $D_1$

$$D_1 = 5.71(1+.05)$$

$$D_1 = 5.99$$

Revised current market price

$$P_0 = \frac{D_1}{(k_e - g)} = \frac{5.99}{(.18 - .05)} = \frac{5.99}{0.13} = 46.07$$

**Illustration 3:**

200,000 debentures of Rs. 500 each are being issued at a discount of 5%. Coupon rate is 15% .Floatation cost is 5% of the face value. Redemption will be after 10 years at a premium of 10%. The tax rate is 40%. Determine the cost of debt.

**Solution:**

Using the following formula

$$K_d = \frac{I(1-t) + (RV - NP)/n}{(RV + NP)/2}$$

$$RV = 500 + 10\% \text{ of } 500 = 550$$

$$NP = 500 - 25 - 25 = \text{Rs } 450$$

$$I = 75$$

$$N = 10 \text{ years}$$

$$K_d = \frac{75(1 - .40) + (550 - 450)/10}{(550 + 450)/2}$$

$$= 0.11 \text{ or } 11\%$$

**Illustration 4:**

Your Company's share is quoted in the market at Rs. 50 currently. The company pays a dividend of Rs. 5 per share and the investor's market expects a growth rate of 10% per year. You are required to compute-

- a) The company's equity cost of capital
- b) If the company's cost of capital is 18% and the anticipated growth rate is 10% per annum, calculate market price if the dividend of Rs 5 is to be maintained.

**Solution:**

- a) Using the formula-

$$K_e = \frac{D_1}{P_0} + g$$

**Where,**

$$P_0 = 50$$

$$D_0 = \text{Rs } 5, g = .10$$

$$D_1 = D_0(1+g)$$

$$D_1 = 5(1+.10) = 5.5$$

$$K_e = \frac{5.5}{50} + 0.10$$

$$= 21\%$$

b)  $K_e = .18, g = .10, D_1 = \text{Rs. } 5$

$$P_0 = \frac{D_1}{K_e - g}$$

$$= \frac{5}{0.18 - .10}$$

$$= \text{Rs } 62.5$$

### Illustration 5:

The following figures are taken from the current Balance Sheet of a company:

	(Rs.)
Capital (Face value of Rs 10 per share)	10,00,000
Share Premium	5,00,000
Reserves	<u>6,00,000</u>
Shareholder's Funds	<u>21,00,000</u>
15% Perpetual Debentures	10,00,000

An annual ordinary dividend of Rs. 5 per share had just been paid. In the past, ordinary dividends have grown at the rate of 8% per annum and this growth rate is expected to continue. Annual interest has recently been paid on the debentures. The ordinary shares are currently quoted at Rs. 30 and the debentures at 75%. Ignore taxation. You are required to estimate the weighted average cost of capital (based on market values) for the company.

### Solution:

a) Calculation of cost of equity

$$K_e = \frac{D_1}{P_0} + g$$

Where,

$$D_1 = D_0(1+g)$$

$$= 5(1+.08) = 5.40$$

$$P_0 = \text{Rs } 30$$

$$g = .08$$

$$K_e = \frac{5.40}{30} + .08$$

$$ke = 0.18 + .08 = 0.26$$

b) Calculation of cost of Debt

$$K_d = \frac{I}{MP}$$

Where  $I = 15\% \text{ of Rs } 1000,000 = \text{Rs } 150000$

$MP = 75\% \text{ of Rs } 10,00,000 = \text{Rs } 7,50,000$

$$K_d = \frac{150000}{750000} = 0.20$$

Calculation of market value of shareholder's funds

=Rs 30 X 100,000 shares= Rs 30,00,000

Calculation of WACC based on Market values

Sources of capital	Market value	Weights	Specific cost	Composite cost
Shareholders funds	30,00,000	.8	26	20.8
12% Perpetual Debentures	7,50,000	.2	20	4
	3750000	1.00		24.8

Hence, WACC based on Market Value is 24.8%.

## 9.13 LET US SUM UP

The cost of capital is basically the cost of using funds provided by the owners and creditors of the company. A company can raise the funds from long-term sources, debt, preferred equity and common equity. Further, the cost of funds that company raises, through debt is cheaper compared to the cost of funds from preferred stock or cost of funds from common stock. The objective of a financial manager is to estimate the optimum proportion of each source of fund to keep the cost of capital at its minimum. While doing this, the financial manager recognizes the book values of capital as historical measures and considers the market values of capital. As more and more funds are raised, the cost of each additional amount of new capital may increase. The cause of this could be the floatation cost and the demand for the security representing the capital to be raised. Determining the cost of capital requires a good judgment. It requires an understanding of the current risk and return associated with the company and its securities and also the company's and security's risk and return in the future.

## 9.14 KEY WORDS

**Cost of Capital:** It is the minimum rate of return that will maintain the value of the firm's equity shares.

**Cost of Equity Capital:** It is the discount rate which equates present value of all expected dividends in future with net proceeds per share/current market price.

**Specific Cost:** The cost of individual components of capital.

**Cost of Capital**

**Marginal Cost:** Weighted average cost of new funds.

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## **9.15 SELF-ASSESSMENT QUESTIONS/EXERCISE**

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- 1) What is cost of capital and why is it important for financial decision making?
- 2) Explain the various types of cost of capital and distinguish between them.
- 3) What is business risk and how it is different from financial risk?
- 4) How is overall cost of capital computed?
- 5) Explain the various approaches to calculate cost of equity.

**Problems:**

**Q-1** A company issues 5000 equity shares of Rs 100 each at a premium of 10%. The company has been paying 20% dividend to equity shareholder for the past 5 years and expects to maintain the same in the future also. Compute the cost of equity capital. Will it make any difference in the Market Price?

[Ans- 18.18%, 11.43%]

**Q-2** A company plans to issue 10,000 new shares at Rs 100 each at par. The floatation cost is expected to be 2% of the share price. Company pays dividend of Rs 10 per share initially and growth in the dividend is expected to be 5%. Compute the cost of new issue of equity share.

[Ans -15.20%]

**Q-3 (a)** A Ltd. issues Rs. 10,00,000 8% debentures at par. The tax rate applicable to the company is 40%. Compute the cost of debt capital.

[Ans- 4.8%]

**(b)** B Ltd. issues Rs. 100,000, 6 % debentures at a premium of Rs 10%. The tax rate applicable to the company is 50% .compute the cost of debt capital.

[Ans-3.64%]

**(c)** C Ltd. issues Rs. 100,000 , 6 % debentures at a discount of 5%. The tax rate is 50%. Compute the cost of debt capital.

[Ans-3.158%]

**(d)** D Ltd. issues Rs. 10,00,000, 8% debentures at a premium of 10. The cost of floatation is 2%. The tax rate applicable is 50%. Compute the cost of debt capital. [Ans-3.711%]

**Q-4** A company issues Rs. 20,00,000, 10% debentures at a discount of 5% . The floatation cost amount to Rs. 40,000. The debentures are redeemable

after 8 years. Calculate the after tax cost of debt assuming the the tax rate of 50%.

[Ans-5.63%]

Q-5 ABC Ltd. issues 20,000, 8% preference shares of Rs. 100 each. Cost of issue is Rs. 2 per share. Calculate the cost of preference share capital if shares are issued a) at a premium of 10% and b) at a discount of 10%.

[Ans- 7.40%, 8.69%]

Q-6 A company has on its book the following amounts and specific costs of each type of capital-

Type of capital	Book Value(Rs)	Market Value (Rs)	Specific costs (%)
Debt	400,000	3,80,000	5
Preference share	100,000	1,10,000	8
Equity	600,000	900,000	15
Retained earnings	200,000	300,000	13

Determine the weighted average cost of capital using –

- a) Book Value weights
- b) Market Value weights

[11.1%, 11.9%]

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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# **UNIT 10 VALUATION OF SECURITIES**

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## **Structure**

- 10.1 Objectives
- 10.2 Introduction
- 10.3 The Basic Valuation Model
- 10.4 Valuation of Bonds/Debentures
- 10.5 Valuation of Preference Shares
- 10.6 Valuation of Equity Shares
- 10.7 Valuation of Convertible Debentures
- 10.8 Let Us Sum Up
- 10.9 Key Words
- 10.10 Answers to Check Your Progress
- 10.11 Self-Assessment Questions/Exercises

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## **10.1 OBJECTIVES**

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After studying this unit, you should be able to:

- explain the basic valuation model;
- discuss the method for valuation of bonds;
- understand the method for valuation of preference shares; and
- comprehend the methods for valuation of equity shares and convertible debentures.

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## **10.2 INTRODUCTION**

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The purpose of investment is a commitment of funds for a particular period for return. The investor forgoes its present consumption, therefore, requires some return from the investment. The future value of money will change, so the return is required to compensate for the change in the value of money.

It is always suggested that all investment selections are to be done on a scientific analysis of the value of a security. Therefore, to know how to value securities is always better for an investor. Investors attempt to make gains by buying under-priced securities and sell over-priced securities. And this again points out the importance of understanding the valuation of securities.

In valuation process, three types of analyses are to be done. These are:

- 1) Economic Analysis
- 2) Industry analysis
- 3) Company Analysis

## **Economic Analysis**

As all businesses are part of the economic system, thus, it is important to analyse the general economic environment for the valuation of securities in economic analysis. An analyst is required to analyse the general economic factors affecting the economy. Thus, to analyse Fiscal and Monetary policy and the economic environment it is important for any investor to predict Recession and Boom.

## **Industry Analysis**

All industries are not equally affected by the change in the economic conditions. Some industries are affected more and some less. Industry analysis is a tool that businesses use to assess the market. It is also used by market analysts, as well as by business owners, to find out how the industry dynamics work for the specific industry studied. Industry analysis helps the analyst develop a strong sense of what is going on in the industry. The following problems can be addressed through Industry analysis.

- What are the similarities and differences among industry classification systems?
- How does an analyst go about choosing a peer group of companies?
- What are the key factors to consider when analysing an industry?
- What advantages are enjoyed by companies in strategically well-positioned industries?

## **Company Analysis**

Company analysis is done after the analyst has done industry analysis. It facilitates in understanding the company's external environment and how the company will respond to the threats and opportunities by the external environment. Thus, the intended response is the individual company's competitive strategy. A checklist for company analysis includes a thorough investigation of:

- Company detail
- Characteristics of industry
- Demand and supply of goods and services
- Financial statement analysis
- Company investment policy

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## **10.3 THE BASIC VALUATION MODEL**

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The time value of money affects the valuation of the securities. The current value of any asset is equal to the present price of its predicted returns. Thus, the present value of expected returns to be provided by a security in a length of time will help to estimate the value of that security. This definition of valuation applies to the value of the security.

To estimate the value, you must discount the stream of money flows at required rate of return. Thus, from this discussion we can understand that the technique of estimation of value requires

- the estimated money flows or returns from that security and
- the required rate of return on the investment.

The required return rate is simply a return that an investor would accept as consideration for a given level of risk associated with owning the stock of a company. Financial security has the potential to generate some additional return above its face value in the future. Thus, the value of a security is the present value of the future benefits or future cash flows like interest, dividend, or earnings per period. There are various kinds of securities with various terms and conditions. While talking about the returns, some securities have fixed returns like bonds and some have variable returns like equity.

Let us assume that that risk-adjusted discount rate is 'r', and it is expected that the security will give cash flow for n years. In this case, the present value of the security can be determined as follow:

$$PV = \frac{CF_1}{(1+r)} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \dots + \frac{CF_n}{(1+r)^n}$$

Where PV = present value of security

r = risk-adjusted discount rate

CF = cash flow (expected cash inflow from a particular security)

But here it is to be noted that all investors may not value the same shares equally. They may have different expectations about the returns from security. Also, the risk complexity of the securities may change with time in this dynamic environment.

### Illustration 1:

Compute the value of assets of Company 'A' from the information given below:

Year	Cash Flow (Rs.)
1	10,000
2	10,000
3	10,000
4	10,000

Discount rate is 10%.

$$\text{Value of Asset} = 10,000 \times \text{PVIFA}_{10,4} = 10,000 \times 3.170 = \text{Rs. } 31,700$$

## 10.4 VALUATION OF BONDS/DEBENTURES

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Bonds are long-term debt instruments used by both firms and the government to raise money. The most common type of bond is the one in which investors earn periodic interest and the face value at maturity.

### Types of Bonds

**Convertible bonds:** Convertible bonds can be converted into stock after a predetermined time at the predetermined ratio. Thus, the holder has an option of converting the bond into shares of a company at a predetermined price.

**Non-convertible bonds:** Bonds that cannot be converted into shares are known as non-convertible bonds. The bondholder receives the redemption value at the time of maturity.

**Zero-Coupon Bond:** A zero-coupon bond is one where no coupon is paid. It is purchased at a discounted price and does not pay any periodic interest rates to the bondholder. The return on these bonds is calculated as the difference between the face value and issue price, which is the discounted price.

**Bearer Bonds:** It is a Bond certificate issued without recording the name of the holder. The risk associated with these bonds are they can be either lost or stolen.

**Registered Bonds:** It is a bond whose ownership is recorded by the issuer or by a transfer agent

**Term Bonds:** The bonds issued for a specific term of years and then become due and payable. Most of the corporate bonds are term bonds

**Serial Bonds:** The bonds whose specific principal amounts become due on specified dates before maturity. They are termed as serial bonds.

**Mortgage Bonds:** A bond that is secured against the property of the firm is known as a mortgage bond.

The valuation of a Bond is also based on the concept of the basic valuation model. The value of a bond is obtained by discounting the bond's expected cash flows to the present value using an appropriate discount rate. So, if there is a bond on which a periodic interest is received and also the amount equal to the bond's face value at maturity then-current value of the bond will be calculated by discounting the cash inflows in terms of periodic interest and the maturity value of the bond at a required rate of return on the bond. The basic equation for the present value of a bond on which annual interest is received will be as follows:

$$B_0 = \frac{I}{(1+kd)} + \frac{I}{(1+kd)^2} + \frac{I}{(1+kd)^3} + \dots + \frac{FVB}{(1+kd)^n}$$

Where  $B_0$ = present value of the bond at time zero

$kd$ = required rate of return on bond

$I$  = annual interest on a bond

FVB= face value of a bond

n =number of years to maturity

The above equation can also be represented as:

$$B_0 = \sum_{i=1}^n \frac{I}{(1+kd)^i} + \frac{FVB}{(1+kd)^n}$$

The valuation for a bond can be understood with the following example:

### Illustration 2:

XYZ Ltd. issues a bond with a face value of Rs. 1,000 with the maturity of five years at par to yield 10%. Interest is paid annually on this bond. Calculate the present value of the bond.

**Solution:** Here, Face Value = ₹1000,

$k_d$  (required return on bond) = 10%,

n (number of years to maturity) = 5 years

To calculate the value of the bond, we use the formula given below

- $B_0 = \sum_{i=1}^n \frac{I}{(1+kd)^i} + \frac{FVB}{(1+kd)^n}$

Where  $B_0$ = present value of the bond at time zero

Substituting the given values in the above formula, we get,

$$\text{Here, } B_0 = \sum_{i=1}^5 \frac{100}{(1+.10)^i} + \frac{1000}{(1+.10)^5}$$

$$= 100 (\text{PVA}) + 1,000 (\text{PVIF})$$

$$= 100 (10.5) + 1,000 (10.5)$$

$$= 100 (3.791) + 1000 (.621)$$

$$= 379.1 + 621 = ₹1,000$$

Before you learn, the methods of valuation of bonds let us understand some important basic terms:

- 1) Face Value/Par Value: It is the value of on the face of the bond.
- 2) Coupon Rate: It is the specified interest rate on the bond. The interest is paid to the bond holder which is calculated as : par value  $\times$  coupon rate
- 3) Maturity period : It is the number of years after which face value is paid to the holder of the bond.
- 4) Issue Price: It is that price at which bond is issued to the investor in primary market.
- 5) Market Price: It is that price of the bond at which buying and selling of the bond is done between investors in the secondary market.
- 6) Redemption Value: It is that value at which the bond is redeemed.

### **Yield to Maturity**

Yield to maturity (YTM) is the discount rate at which the sum of all future cash flows from the bond is equal to the price of the bond. The YTM is based on the belief or understanding that an investor purchases the security at the current market price and holds it until the security has matured, and that all interest and coupon payments are made in a timely fashion. YTM is usually an annual percentage rate. The following formula is used to get YTM:

$$YTM = \frac{I + \frac{FV - PV}{t}}{\frac{FV + PV}{2}}$$

Where:

I = Interest payment

FV = Face Value

PV = present Value (current price of the bond)

t = years to maturity

### **Illustration 3**

Assume that there is a bond in the market priced at ₹ 700 and that the bond has a face value of ₹1,000. Yearly coupons for this bond are ₹ 150. The coupon rate for the bond is 15% and the bond will reach maturity in 6 years. Determine YTM.

Solution: We are given,

Market price of bond = ₹700

Face Value = ₹1000

Interest = ₹150

$K_d$ (required return on bond) = 15%

We use the formula below to calculate YTM

$$YTM = \frac{I + \frac{FV - PV}{t}}{\frac{FV + PV}{2}}$$

Where, I = Interest payment

FV = Face Value

PV = present Value (current market price of the bond)

t = years to maturity

Substituting the given values in the above formula, we get,

$$YTM = \frac{150 + \frac{1000 - 700}{6}}{\frac{1000 + 700}{2}}$$

**Debt valuation****Illustration 4:**

Mr. A has invested in 8% debentures of Rs. 500 which are redeemable after 5 years at par. Calculate the value of bond if the required rate of return is 14% and 7%.

**Solution:** We are given

$$\text{Redeemable Value (RV)} = 500$$

$$\text{Interest} = 8\%$$

$$\text{Required rate of return } k_d = 14\%$$

$$\text{years to maturity } n = 5 \text{ years}$$

$$\text{Annual interest} = 8\% \text{ of } 500 = 40$$

Bond Value at 14% at 5 years

$$\begin{aligned}\text{Bond value} &= I (\text{PVAF}_{k_d, n}) + RV (\text{PVF}_{k_d, n}) \\ &= 40 (\text{PVAF}_{14,5}) + 500 (\text{PVF}_{14,5}) \\ &= 40 \times 3.4331 + 500 \times 0.5194 \\ &= 137.324 + 259.7 \\ &= \text{Rs. 397.024}\end{aligned}$$

Bond Value at 7% at 5 years

$$\begin{aligned}\text{Bond Value} &= 40 (\text{PVAF}_{7,5}) + 500 (\text{PVF}_{7,5}) \\ &= 40 (4.1002) + 500 (0.7130) \\ &= 164.008 + 356.6 \\ &= \text{Rs. 510}\end{aligned}$$

**Illustration 5:**

Mr. A has invested in 10% debentures of Rs. 1000 which are redeemable after 4 years at par. Calculate the value of bond if interest is paid a) annually b) semi-annually c) quarterly basis. Assume that the required rate of return is 12%

**Solution:** We are given

$$\text{Redeemable Value} = ₹1000$$

$$\text{Interest} = 10\%$$

$$\text{Required rate of return} = 12\%$$

$$\text{years to maturity } n = 4 \text{ years}$$

Annual interest = 10% of 1000 = ₹100

$$\begin{aligned}
 \text{a) Bond value} &= I (\text{PVAF}_{kd,n}) + RV (\text{PVF}_{kd,n}) \\
 &= 100 \times 3.0373 + 1000 \times 0.6355 \\
 &= 303.73 + 635.5 \\
 &= \text{Rs. 939.23}
 \end{aligned}$$

**Ans. The value of the bond is ₹939.23**

$$\begin{aligned}
 \text{b) Bond value} &= I/2 (\text{PVAF}_{kd/2,n*2}) + RV (\text{PVF}_{kd/2,n*2}) \\
 &= 100/2(6.2098) + 1000 (0.6274) \\
 &= 310.49 + 627.4 \\
 &= ₹937.89
 \end{aligned}$$

**Ans. The value of the bond is ₹937.89**

$$\begin{aligned}
 \text{c) Bond value} &= I/4 (\text{PVAF}_{kd/4,n*4}) + RV (\text{PVF}_{kd/4,n*4}) \\
 &= 100/4(12.561) + 1000(0.6232) \\
 &= 314.025 + 623.2 \\
 &= 937.22
 \end{aligned}$$

**Ans. The value of the bond is ₹937.22**

#### Illustration 6:

Mr. A has invested in 6% debentures of Rs. 1000 which are redeemable after 7 years at premium for Rs. 1100. Calculate the value of bond if the required rate of return is 15%.

**Solution:** We are given

Redeemable Value = ₹1100

Interest = 6%

Required rate of return = 15%

Annual interest = 6% of 1000 = 60

$$\begin{aligned}
 \text{Bond value} &= I (\text{PVAF}_{kd,n}) + RV (\text{PVF}_{kd,n}) \\
 &= 60 \times 4.1604 + 1100 \times 0.3759 \\
 &= 249.624 + 413.49 \\
 &= \text{Rs. 663.114}
 \end{aligned}$$

**Ans. The value of the bond is ₹ 663.114**

#### Illustration 7:

9% debentures of Rs. 800 which is redeemable after 5 years at par. Calculate the value of the bond if the required rate of return is 15%. Also, state whether Mr. A should buy the debentures if the current market price is Rs.600, and will your answer be the same if the current market price is Rs.650?

**Solution:** We are given

Redeemable Value = ₹800

Interest = 9%

Required rate of return = 15%

Annual interest = 9% of 800 = 72

$$\text{Bond value} = I (\text{PVAF}_{kd, n}) + \text{RV} (\text{PVF}_{kd, n})$$

$$= 72 \times 3.3522 + 800 \times 0.4972$$

$$= 241.35 + 397.76$$

$$= \text{Rs. } 639.11$$

**Ans.** The value of the bond is ₹639.11. If the current market price is Rs.600 then Mr. A should buy the bonds as the fair value is more than the market price. However if the current market price is Rs.650 then Mr. A should not buy the bonds as the fair value is less than the market price.

## 10.5 VALUATION OF PREFERENCE SHARES

Preference shares are a kind of hybrid securities in which some features of bonds and some features of equity shares are present. The rate of dividend on such shares is usually specified. Thus, at the time of buying such shares, an investor knows about the rate of dividend. There are many types of preference shares.

Preference shares can be convertible or non-convertible, redeemable or irredeemable, participating or non-participating, Cumulative and Non-Cumulative, and shares with callable options.

Dividends on preference shares are specified like bonds. Preference shareholders get preference over equity shareholders when it comes to the payment of dividends. In the case of cumulative preference shares, if a company is not able to pay dividends in a particular year, then dividends on them may accumulate over time. And before paying the dividend to equity shareholders it is required that arrears of preference dividends are cleared first.

Thus, preference shares are less risky in comparison to equity shares. But when it comes to comparison between preference shares and bonds then preference shares are riskier as there is a priority in payment and liquidation towards bonds. Bonds are usually secured and thus enjoy the protection of the principal.

The value of a redeemable preference share is the present value of all the future expected dividend payments and the maturity value, discounted at the required return on preference shares.

## Value of Redeemable Preference Shares

The value of Redeemable preference share can be ascertained as follows:

$$V = \sum_{i=1}^n \frac{D_i}{(1+k_p)^i} + \frac{\text{Redemption Value}}{(1+k_p)^n}$$

Where,  $D_i$  = Dividend in the year  $i$

$K_p$  = required rate of return

$n$  = years to maturity

### Illustration 8:

The face value of the preference share is ₹1000 and the stated dividend rate is 9%. The shares are redeemable at par after 5 years period. Calculate the value of preference shares if the required rate of return is 13%.

**Solution:** We know the value of preference share can be calculated with the help of the formula below

$$V = \sum_{i=1}^n \frac{D_i}{(1+k_p)^i} + \frac{\text{Redemption Value}}{(1+k_p)^n}$$

Where,  $D_i$  = Dividend in the year  $i$  =  $1000 \times 9\%$

$k_p$  = required rate of return on preference shares = 13%

$n$  years to maturity = 5 years

Substituting the given values in the above formula, we get,

$$\text{Here, } V = \sum_{i=1}^5 \frac{90}{(1+.13)^i} + \frac{1000}{(1+.13)^5}$$

$V$  = Rs. 859.31(approx.)

## Value of Irredeemable Preference Shares

In this case dividends from preference shares are assumed to be perpetual payments. Intrinsic value or the present value of such shares can be calculated as follows:

$$V = \frac{D}{(k_p)}$$

Where  $D$  = Dividend on preference shares

$K_p$  = required rate of return.

### Illustration 9:

A firm issued preference shares of Rs. 800 each with a specified dividend of Rs. 125 per share. The investors' required rate of return is 10%. What will be the value of the preference shares today?

We know,

$D_i$ =Dividend in the year 1 =₹125

$k_p$  = required rate of return on preference shares = 10%

$$V = \frac{D}{(k_p)}$$

$$V = \frac{125}{(0.10)}$$

Value of preference share =Rs. 1250

#### Illustration 10:

Mr. ‘A’ wants to purchase a 7% preference share of Rs. 2000 redeemable after 5 years at par. What should he be willing to pay now to purchase the share? Assume that the required rate of return is 10%.

**Solution:** Value of preference share will be calculated with the help of the following formula-

$$= D (PVAF_{k_p, n}) + P_n (PVF_{k_p, n}),$$

Where,  $D_i$ =Dividend in the year i =  $2000 \times 7\% = 140$

$k_p$  = required rate of return on preference shares = 10%

$n$  = years to maturity = 5 years

Substituting the given values in the above formula, we get,

$$= 140 \times 3.7908 + 2000 \times 0.6209$$

$$= 530.712 + 1241.8$$

$$= \text{Rs. } 1772.512$$

**Ans. The value of preference share is Rs. 1772.512**

#### Illustration 11:

Mr. A wants to purchase a 9% preference share of Rs. 1000 redeemable after 3 years at a premium for Rs. 1050. What is the value of preference shares assuming that the required rate of return is 15%

**Solution:** Value of preference share will be calculated as follows-

$$= D (PVAF_{k_p, n}) + P_n (PVF_{k_p, n})$$

$D_i$ =Dividend in the year 1 =  $1000 \times 9\% = 90$

$k_p$  = required rate of return on preference shares = 15%

$n$  = years to maturity = 3 years

Substituting the given values in the above formula, we get,

$$V = 90 \times 2.2832 + 1050 \times 0.6575$$

$$= 205.488 + 690.375$$

**Ans. The value of preference share is Rs. 895.863**

**Illustration 12:**

Mr. A has invested in an irredeemable preference share of Rs. 1000. He receives a dividend of Rs. 80 annually. What is the value of preference shares assuming that the required rate of return is 10%?

**Solution:** Value of irredeemable preference share will be calculated as follows-

$$V = D/K_p$$

Where  $D$  = Dividend = 80

$K_p$  = required rate of return on preference shares = 10%

Substituting the given values in the above formula, we get,

$$= 80/10$$

$$= \text{Rs. } 800$$

**Ans. The value of preference share is Rs. 800**

**Check Your Progress A**

**Q 1.** What is the formula of yield to maturity method?

.....  
 .....

**Q 2.** What are the different types of bonds?

.....  
 .....

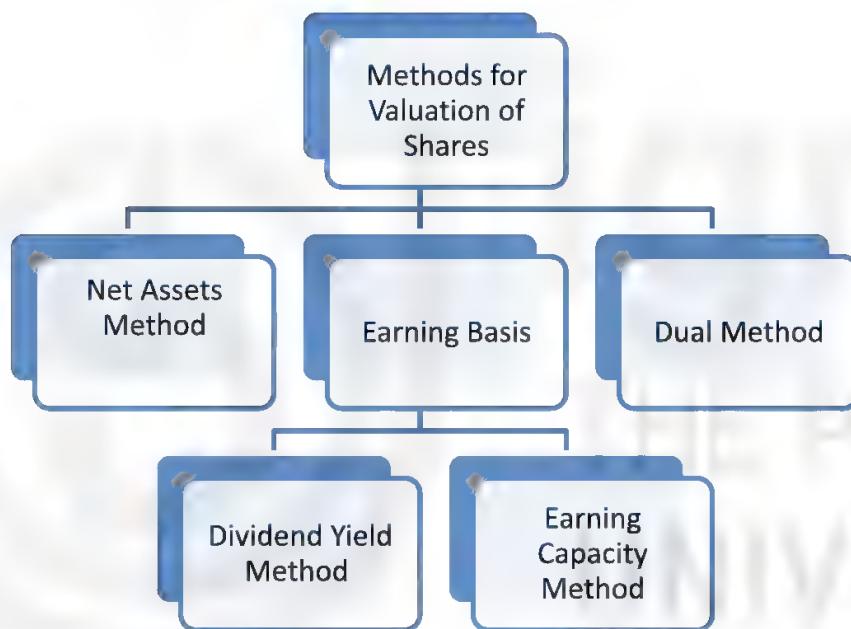
**Q3.** Mr. A purchased a bond whose face value is ₹ 1000 which is redeemable after 5 years at par. The coupon (interest) rate is 7%. At what price will the investor be willing to purchase the bond today if the required rate of return is 8%.

**Q4.** An investor purchases a bond of value ₹ 1000 having a coupon rate of 12% Calculate the value of the bond if the required rate of return on the bond is 10% and it matures at par after a period of 3 years?

## 10.6 VALUATION OF EQUITY SHARES

Ordinary shares are also called equity shares or common shares. Investors would like to invest in equity shares with an expectation to earn dividends and to get the benefit of capital gains arising out of selling such shares. The equity shareholders usually buy the shares when they find that the market value is lower than its intrinsic value and sell it when the market value is more than its intrinsic value. This is how they realize a capital gain on the transaction.

Some investors expect that the company would grow well in the future and in anticipation of that, they retain their shares for a longer time.



### A Net Asset Method

The net asset method is also called as Asset Backing method or Intrinsic Value method or break up value method. Under this method, the stress is on the protection of investment because the investors always need safety for his or her investments. Under this method, the net assets of the corporate are divided by the number of shares to reach the net asset value of each share. That is, the value per share is arrived at by first valuing the assets of the company and then deducting the value of liabilities and claims of preference shareholders, from the value of assets. Many times, people have confusion regarding the inclusion of Goodwill in the net assets. For this, one must know that unless otherwise stated goodwill is included in the net assets.

Thus, the following points are to be considered:

- The value of goodwill will be ascertained.
- Fixed assets will be considered at their realizable value.

- Floating assets are to be taken at market value.
- The stock of finished goods is to be taken at their market value whereas other stocks such as raw materials, stores, and spare parts or stock in the process may be taken at their cost.
- Fictitious assets are not to be taken into consideration.
- Provision for depreciation, bad debts provision, etc. must be considered.
- Find out the external liabilities of the company payable to outsiders including contingent liabilities.
- If cum dividend price of shares is required then the proposed dividend is not deducted as a liability. But if an ex-dividend price is desired then the proposed dividend is deducted as a liability

### B Earning Basis Method

The earning basis of share valuation is expressed through:

1) Yield method or Dividend yield method

2) Earning Capacity Method

#### 1) Yield Method or Dividend Yield Method

Investors are interested in income. They value the share based on expected dividends. The value of a share under this method is determined by comparing the expected rate of the dividend of a company with the Normal rate of Dividends as prevailing in the industry.

$$\text{Value of Shares} = \frac{\text{Rate of dividend expected}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

$$\text{And, Rate of dividend expected} = \frac{\text{Profit Available for Dividend}}{\text{Total paid up capital}} \times 100$$

#### Illustration 13:

XYZ Ltd. has issued shares of ₹100 each, ₹90 paid up. The rate of dividend is declared by the company as 10%. The normal rate of return is 9%. Find the value of the share.

**Solution:** To find the value of share we will use:

$$\text{Value of Shares} = \frac{\text{Rate of dividend expected}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

Where the Expected rate of dividend = 10%,

Normal rate = 9%,

Paid-up value = ₹90

Substituting the given values in the above formula, we get,

$$\text{Value of Shares} = \frac{10}{9} \times 90 = ₹100$$

#### 2) Earning Capacity Method

When somebody is interested to own the bulk of shares of a corporation, he makes use of earning capacity method for valuation of shares. Thus, profits earned by the corporate are compared with the quantity of capital

employed within the business, and the rate of earning is discovered in the following manner:

$$\text{Rate of Earning} = \frac{\text{Profit earned}}{\text{Capital employed}} \times 100$$

$$\text{Value of Shares} = \frac{\text{Rate of earning}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

Here profit earned means the profits that are available after payment of interest to debenture holders and dividends to preference shareholders.

#### **Illustration 14:**

A company has employed equity capital of ₹5,00,000 of ₹50 each fully paid up. It is an all-equity firm. The average profits of the company are ₹50,000 and the estimated rate of capitalization is 20%. Find the value of shares as per earning capacity method.

#### **Solution:**

Valuation of share under Equity Capacity Method can be done as follows-

$$\text{Average profit} = 50,000$$

We use the formula below to calculate the rate of earning

$$\text{Rate of Earning} = \frac{\text{Profit earned}}{\text{Capital employed}} \times 100$$

$$\text{Where Profit earned} = ₹ 50000, \text{Capital employed} = ₹ 5,00,000$$

Substituting the given values in above formula, we get,

$$\text{Rate of Earning} = \frac{50,000}{5,00,000} \times 100 = 10\%$$

The value of shares can be calculated as follows:

$$\text{Value of Shares} = \frac{\text{Rate of earning}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

$$\text{Where Normal rate of return} = 20\%$$

Substituting the given values in the above formula, we get,

$$\text{Value of equity share} = \frac{10}{20} \times 50 = ₹25$$

#### **Fair Value Method**

The fair value method is also called as Dual method.

Some accountants don't prefer to use Intrinsic Value or Yield Value to determine the correct value of the shares. However, they prescribe the Fair Value Method which is the mean of the values derived from the method of Intrinsic Value and Yield Value, and the same gives a better indication of the value of the shares. The value of share under this method can be calculated as follows:

$$\text{Value per share} = \frac{\text{Value of share on earning basis} + \text{Value of share on Net Assets Basis}}{2}$$

**Illustration 15:**

If the value of the share as per the Intrinsic value method is ₹200.50 and as per the Yield method is ₹99.50 then the value as per the fair value method will be calculated as follows:

Value as per fair value method

$$= \frac{\text{Value of share on earning basis} + \text{Value of share on Net Assets Basis}}{2}$$

Substituting the given values in the above formula, we get,

$$= \frac{99.50 + 200.50}{2} = ₹150$$

**Dividend discount model**

The valuation of Equity shares with the help of the dividend discount model is also based on the concept of the basic valuation model. The value of an equity share is obtained by discounting the expected dividends to the present value using an appropriate discount rate. So, if there is a share on which a periodic dividend is received and also the expected price of a share is known then the value of the shares will be calculated by discounting the dividend streams and expected price of the share at a required rate of return. If the value of share computed using the dividend discount model is higher than the current market price of shares, then we can say that the share is undervalued or underpriced and that the investor should buy the share as its intrinsic or fair value is more than the price prevailing in the market. On the other hand, if the value of share computed using the dividend discount model is lower than the current market price of shares, then we can say that the share is overvalued or overpriced and that the investor should not buy the share as its intrinsic or fair value is less than the price prevailing in the market.

The basic equation for calculating the present value of an equity share on which annual dividend is received will be as follows:

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \frac{D_3}{(1+k_e)^3} + \dots + \frac{P_n}{(1+k_e)^n}$$

Where  $P_0$  = present value of the share at time zero

$k_e$  = required return on share

$D_1$  = expected dividend after one year

$P_n$  = expected price of shares after  $n$  years

$n$  = number of years to maturity

The above equation can also be represented as:

$$P_0 = \sum_{i=1}^n \frac{D_i}{(1+k_e)^i} + \frac{P_n}{(1+k_e)^n}$$

**The formula for calculating the fair value of equity share using the Dividend Discount Model under various cases**

**a) For one year holding period**

The value of equity share is:

$$P_0 = \frac{D_1 + P_1}{1 + k_e}$$

where  $P_0$ = present value of the share at time zero

$k_e$ = required return on share

$D_1$  = expected dividend after one year

$P_1$ = Expected price of shares after 1 year

**b) For the multi-year holding period**

The value of equity share is:

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_2}{(1+k_e)^2} + \frac{D_3}{(1+k_e)^3} + \dots + \frac{P_n}{(1+k_e)^n} \text{ or,}$$

$$P_0 = D \cdot (PVFA_{k_e, n}) + P_n \cdot (PVF_{k_e, n})$$

where  $P_0$ = present value of the share at time zero

$k_e$ = required return on share

$D$  = expected dividend/future dividend payments

$P_n$ = Expected price of shares after  $n$  years

$n$  =number of years to maturity

**c) Indefinite holding period**

**i. No growth in dividends**

If there is no growth in the dividends then the value of the share will be calculated as:

$$P_0 = \sum_{n=1}^{\infty} \frac{D_0 (1+g)^2}{(1+k_0)^n}$$

$$P_0 = \frac{D}{k_e}$$

where  $P_0$ = present value of the share at time zero

$k_e$ = required return on share

$D$  = expected dividend/future dividend payments

**ii. Constant growth in dividends**

If there is constant growth in the dividends then the value of the share will be calculated as:

$$P_0 = \frac{D_1}{k_e - g}$$

where  $P_0$ = present value of the share at time zero

$k_e$ = required return on share

$D_1$  = expected dividend after one year

$g$  = growth rate

### iii. *Multiple growth rates*

If there are multiple growths in the dividends then the value of the share will be calculated as:

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_1(1+g)}{(1+k_e)^2} + \frac{D_1(1+g_1)}{(1+k_e)^3} + \dots + \frac{D_1(1+g_n)}{(1+k_e)^n} + \frac{\frac{D_n(1+g_1)}{k_e - g_2} \times \frac{1}{(1+k_e)^n}}{(1+k_e)^n}$$

where  $P_0$  = present value of the share at time zero

$k_e$  = required return on share

$D_1$  = expected dividend after one year

$g$  = first growth rate

$g_1$  = second growth rate

## Equity valuation

### Illustration 16:

PQR Ltd. has issued shares of ₹200 each, ₹192 paid up. The rate of dividend is declared by the company as 10%. The normal rate of return is 8%. Find the value of the share.

**Solution:** To find the value of share we will use:

$$\text{Value of Shares} = \frac{\text{Rate of dividend expected}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

Where, the Expected rate of dividend = 10%,

Normal rate = 8%, and Paid-up value = ₹192

Substituting the given values in the above formula, we get,

$$\text{Value of Shares} = \frac{10}{8} \times 192 = ₹240$$

**Ans.** The value of share is ₹240

### Illustration 17:

A company has employed equity capital of ₹10,00,000 of ₹100 each fully paid up. It is an all-equity firm. The average profits of the company are ₹1,00,000 and the estimated rate of capitalization is 20%. Find Value as per earning capacity method.

**Solution:** Valuation of share under Equity Capacity Method

Here, Average profit = 1,00,000, Capital employed = ₹10,00,000

$$\text{Rate of Earning} = \frac{\text{Profit earned}}{\text{Capital employed}} \times 100$$

Substituting the given values in above formula, we get,

$$\text{Rate of Earning} = \frac{1,00,000}{10,00,000} \times 100 = 10\%$$

$$\text{Value of Shares} = \frac{\text{Rate of earning}}{\text{Normal rate of dividend}} \times \text{Paid up value of share}$$

Where Normal rate of return = 20%

Substituting the given values in the above formula, we get,

$$\text{Value of equity share} = \frac{10}{20} \times 100 = ₹50$$

**Ans. The value of share is Rs. 50**

#### Illustration 18:

If the value of the share as per the Intrinsic value method is ₹160 and as per the Yield method is ₹ 140 then the value as per the fair value method will be calculated as follows:

**Solution:** Value as per fair value method

$$= \frac{\text{Value of share on earning basis} + \text{Value of share on Net Assets Basis}}{2}$$

Substituting the given values in the above formula, we get,

$$= \frac{160 + 140}{2} = ₹150$$

**Ans. The value of share is ₹150**

#### Illustration 19:

The current market price of a share is Rs. 100. The expected dividend is Rs. 5 per share and the expected price of share after one year is Rs. 110. Calculate the value of the share and should it be bought at the current market price if the required rate of return is 10 %?

**Solution:** We are given expected dividend=  $D_1$  = Rs. 5

Expected Price =  $P_1$  = Rs.110

Required rate of return =  $K_e$ = 10%

$$\text{Therefore, the value of equity share} = \frac{D_1 + P_1}{1 + K_e}$$

Substituting all the values in the formula above,

$$= \frac{5 + 110}{1 + 0.10} = \frac{115}{1.1} = ₹104.5$$

**Ans. The value of equity is Rs. 104.5 and hence the investor should buy it at the current market price of Rs. 100.**

#### Illustration 20:

The current market price of a share is Rs. 140. The expected dividend is Rs. 10 per share and the expected price of share after one year is Rs. 150. Calculate the value of the share and should it be bought at the current market price if the required rate of return is 20%?

**Solution:** We are given, Expected dividend=  $D_1$  = Rs. 10

Expected Price =  $P_1$  = Rs.150

Required rate of return =  $K_e$  = 20%

Therefore, the value of equity share =  $\frac{D_1 + P_1}{1 + K_e}$

Substituting the given values in the above formula, we get,

$$= \frac{10 + 150}{1 + 0.20} = \frac{160}{1.2} = 133.33$$

**Ans. The value of equity is Rs. 133.33 and hence the investor should not buy it at the current market price of Rs. 140.**

### Illustration 21:

Mr. A wants to invest in the shares of ABC Co. for the next 7 years. The company is expected to declare a dividend of Rs. 10 per share at the end of every year for the next 7 years. The projected price of the share at the end of the seventh year is Rs. 200. Calculate the value of the share and should it be bought now at the current market price of Rs. 160, if the required rate of return is 10%?

**Solution:** We know that the

$$D_1 = D_2 = D_3 = D_4 = D_5 = D_6 = D_7 = \text{Rs. } 10,$$

Where,  $D_1$  = Expected dividend after one year

And expected price after seven years =  $P_7$  = Rs.200

Required rate of return =  $K_e$  = 10%

Therefore, the value of equity share =  $D(PVFA_{ke, n}) + P_n(PVF_{ke, n})$

Substituting the given values in above formula, we get,

$$= 10 (PVFA_{10\%, 7}) + 200(PVF_{10\%, 7})$$

$$= 10 (4.868) + 200 (0.513) = 48.68 + 102.6$$

$$=\text{₹}151.28$$

**Ans. The value of equity is Rs. 151.28 and hence the investor should not buy it at the current market price of Rs. 160.**

### Illustration 22:

Mr. A wants to invest in the shares of XYZ Co. The company declared a dividend of Rs. 10 per share last year. Calculate the value of a share if the required rate of return is 15% and there is no growth in dividends.

**Solution:** Last dividend declared =  $D_0$  = Rs. 10

Since there is no growth in dividends,

Therefore, expected dividend after one year =  $D_1 = D_0 = 10$

Required rate of return =  $K_e$  = 15%

If there is no growth in the dividends then the value of the share will be calculated as:

$$P_0 = \frac{D_1}{k_e}$$

Substituting the given values in the above formula, we get,

$$= 10/15$$

$$= \text{Rs. } 66.67$$

**Ans.** The value of equity share is Rs. 66.67 when there is no growth in the dividends.

### Illustration 23:

Mr. A wants to invest in the shares of a company. The company declared a dividend of Rs. 20 per share last year. Calculate the value of a share if the required rate of return is 20% and the dividends are expected to grow at a constant rate of 15%?

**Solution:** Last dividend declared =  $D_0 = \text{Rs. } 20$

Required rate of return =  $K_e = 20\%$

Growth rate =  $g = 15\%$

Since dividends are expected to grow at constant rate of 15%,

Expected dividend after one year =  $D_1 = D_0 (1 + g)$

$$D_1 = 20(1+0.15) = 23$$

The value of share will be calculated as

$$P_0 = \frac{D_1}{k_e - g}$$

Substituting the given values in the above formula, we get,

$$= \frac{23}{0.20 - 0.15} = \text{₹}460$$

**Ans.** The value of equity share is Rs. 460 when there is constant growth at the rate of 15% in dividends.

### Illustration 24:

Mr. A wants to invest in the shares of PQR Co. The company declared a dividend of Rs. 10 per share last year. The dividends of the company are expected to grow at a rate of 15% for the next five years and thereafter it is expected to grow at a rate of 18% p.a. forever. Calculate the value of the equity if the required rate of return is 15%

**Solution:** Last dividend declared =  $D_0 = \text{Rs. } 10$

Required rate of return =  $K_e = 20\%$

Growth rate =  $g = 15\%$  for the first 5 years and then  $g_1 = 18\%$  forever

Since dividends are expected to grow at rate of 15% for first 5 years

Expected dividend after one year =  $D_1 = D_0 (1 + g)$

$$D_1 = 10 (1+0.15) = 11.5$$

Similarly,

Expected dividend after two-years =  $D_2 = D_0 (1 + g)^2 = 13.225$

Expected dividend after three years =  $D_3 = D_0 (1 + g)^3 = 15.208$

Expected dividend after four years =  $D_4 = D_0 (1 + g)^4 = 17.490$

Expected dividend after five years =  $D_5 = D_0 (1 + g)^5 = 20.11$

Now we calculate the Present value of dividends for the first 5 years

Dividends	PVF <sub>20%, n</sub>	PV
11.5	0.833	9.5795
13.225	0.694	9.17815
15.208	0.579	8.805432
17.49	0.482	8.43018
20.11	0.402	8.08422
Total		<b>44.07748</b>

From 6<sup>th</sup> year onwards,  $g_1 = 18\%$

Therefore, expected dividend after six years =  $D_6 = D_5 (1 + g_1) = 20.11(1.18) = 23.729$

Now, since after 5 years the dividend grows at a constant rate of 18%,

Price of share after five years =  $P_5 = \frac{D_6}{k_e - g_1}$

Substituting all the values in the formula above,

$$= 23.729 / (0.20 - 0.18) = \text{Rs. } 1186.45$$

And, Present value of  $P_5 = 1186.45 \times 1/(1+ 0.20)^5$

$$= 1186.45 \times 0.402$$

$$= 476.95$$

**Therefore, the value of equity is**

$$P_0 = \frac{D_1}{(1+k_e)} + \frac{D_1 (1+g)}{(1+k_e)^2} + \frac{D_1 (1+g_1)}{(1+k_e)^3} + \dots + \frac{D_1 (1+g_2)^n}{(1+k_e)^n} + \frac{D_n (1+g_1)}{(k_e - g_2)} \times \frac{1}{(1+k_e)^n}$$

$$\text{i.e., Rs } 44.077 + 476.95 = \text{Rs. } 521.03$$

**Ans. The value of equity share is Rs. 521.03.**

**Illustration 25:**

The current market price of a share is Rs. 60. The expected dividend is Rs. 5 per share and the growth rate is 7%. Calculate the value of the share and should it be bought at the current market price if

- a) market return is 10 %
- b) Risk-free rate is 5%
- c) Beta of the company is 2

**Solution:** We are given,

Market return =  $R_m = 10\%$

Risk free rate of return =  $R_f = 5\%$

Beta =  $\beta = 2$

Growth rate =  $g = 7\%$

According to capital asset pricing model

$$K_e = R_f + (R_m - R_f) \beta$$

Where,  $k_e$  = the required rate of return on equity

$R_m$  = Market return

$R_f$  = Risk free rate of return

Therefore,

$$\begin{aligned} k_e &= 0.05 + (0.1 - 0.05) \times 2 \\ &= 0.15 \end{aligned}$$

Now, we calculate the value of the share

$$= \frac{D_1}{k_e - g}$$

Where,  $D_1$  = Expected dividend after one year

$k_e$  = the required rate of return on equity

$g$  = growth rate

Substituting the given values in above formula, we get,

$$\begin{aligned} &= 5 / (0.15 - 0.07) \\ &= ₹62.5 \end{aligned}$$

**Ans.** Since the fair value of share i.e., Rs. 62.5, is higher than the current market price i.e., Rs. 60, the investor should buy the shares.

## 10.7 VALUATION OF CONVERTIBLE DEBENTURE

A convertible debenture/bond refers to fixed-income debt security that generates interest payments and can be converted into a pre-set or fixed number of equity shares. The debenture/bond can be converted into stock at a specific time during the life of the bond, usually at the preference of the bondholder. If an investor chooses to keep the bond and not convert it into shares then he will receive the face value at the time of maturity. A convertible bond presents an investor with a form of hybrid security and a flexible financing opportunity for issuing companies. It has characteristics of a bond for instance maturity date, coupon rate, face value, and payment of interest to the investors during the life of a bond in addition to offering the investor a chance to own an equity share.

**Conversion ratio** refers to the number of shares the bondholder will get from converting one bond. For example, a ratio of 1:10 means that one bond can be converted to 10 equity shares.

**The conversion price** is the price of each share or per share at which a convertible bond can be converted into equity shares. It is calculated by dividing the face value of the bond by the conversion ratio. The conversion price and ratio are set at the time of the issuance of debenture and can be obtained from the bond indenture.

**The conversion value** refers to the value of equity shares obtained after the bonds have been converted. Conversion value can be determined by the product of the conversion ratio and the current market price of the equity share.

**The conversion premium** is the excess of the convertible bond's price today over its intrinsic value. It is calculated by subtracting the convertible bond's intrinsic value from its price today.

**Illustration 26:** A company issued 1000, 10% debentures of ₹100 each redeemable after 5 years. At maturity, the bondholder has an option to convert the debentures into equity shares of the company. The conversion ratio is 1:10, and the current market price of a share is ₹8 per share. The current price of the debenture is ₹95.

**Solution:**

We are given that the conversion ratio is 1: 10 i.e., the investor will receive 10 shares for each debenture. Then the number of shares a bondholder will receive from converting the bonds will be 10,000 shares.

- 1) The conversion price will be = Face Value / Conversion ratio i.e.,  $\frac{₹100}{10} = ₹10$  per share.
- 2) The conversion value will be = Conversion Ratio  $\times$  Current market price of share i.e.,  $10 \times ₹8 = ₹80$

- 3) The conversion premium = Bond Price today - Intrinsic value i.e., ₹95  
 $\text{₹}80 - \text{₹}5$

The valuation of convertible debentures is quite similar to the valuation of redeemable debentures. At the time of maturity of the debentures, the debenture holder will have an option to convert the bonds into equity shares of the company. It is assumed that the debenture holder will go with the option only if it gives a higher value.

**Straight bond value** is the value of a convertible bond if it was not converted into equity shares. This value is calculated in a similar manner as of a regular redeemable debenture i.e., by discounting the cash inflows in terms of periodic interest and the maturity value of the bond to present value at a required rate of return on the bond.

The value of convertible debenture in such case is taken as the higher value between the

1. Straight Bond value and
2. Conversion value

Another way of determining the value of the convertible bond will be to compare the current market price of a share with the conversion price. If the current market price of a share is higher than the conversion price then it is likely that the investor will go for the conversion of the bonds into equity share and, in such case, the value of the bond will be equal to the conversion value. Whereas if the current market price of shares is less than the conversion price then it is unlikely that the investor will opt for converting their debentures into the shares the value of the convertible bond will be equal to the straight bond value.

**Illustration 27:** A company issued 1000, 10% debentures of ₹100 each redeemable at par after 5 years. At maturity, the bondholder has an option to convert the bonds into equity shares of the company. The conversion ratio is 1:10, the current market price of a share is ₹8 per share and the current price of the bond is ₹95. The rate of discount is 5%. Determine the price of the convertible bond

#### **Solution:**

We are given

Redeemable Value = ₹100

Interest = 10%

Required rate of return = 5%

n (years to maturity) = 5 years

Annual interest = 10% of 100 = ₹10

The current market price of a share is ₹8

The current market price of bond = ₹95

The value of Straight Bond =  $I \times (PVAF \text{ kd, n}) + RV \times (PVF \text{ kd, n})$

$$\begin{aligned} &= 10 \times 4.3295 + 100 \times 0.7835 \\ &= 43.295 + 78.35 \\ &= \text{Rs. } 121.645 \end{aligned}$$

The conversion value = Conversion Ratio  $\times$  Current market price of share  
i.e.,  $10 \times \text{₹}8 = \text{₹}80$

**Ans.** Since the straight bond value is higher than the conversion value, the investor will not opt for converting the bonds into equity shares

**Illustration 28:** A company issued 1000, 15% debentures of ₹100 each redeemable at par after 10 years. At maturity, the bondholder has an option to convert the bonds into equity shares of the company. The conversion ratio is 1:5, the current market price of a share is ₹22 per share and the current price of the bond is ₹95. The rate of discount is 15%. Determine the price of the convertible bond.

#### Solution:

We are given

Redeemable Value = ₹100

Interest = 15%

Required rate of return = 10%

n (years to maturity) = 10 years

Annual interest = 15% of 100 = ₹15

The current market price of a share is ₹10

The current market price of bond = ₹95

The value of Straight Bond =  $I \times (PVAF \text{ kd, n}) + RV \times (PVF \text{ kd, n})$

$$\begin{aligned} &= 15 \times 5.0188 + 100 \times 0.2472 \\ &= 75.282 + 24.72 \\ &= \text{Rs. } 100.002 \end{aligned}$$

The conversion value = Conversion Ratio  $\times$  Current market price of share  
i.e.,  $5 \times \text{₹}22 = \text{₹}110$

**Ans.** Since the straight bond value is less than the conversion value, the investor will opt for converting the bonds into equity shares

#### Check Your Progress B

**Q1.** What are convertible debentures?

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.....

**Q2.** What do you mean by conversion premium?

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.....  
.....

**Q3.** Mr. A wants to invest in the shares of ABC Co. The company declared a dividend of Rs. 15 per share last year. Calculate the value of a share if the required rate of return is 15% and there is no growth in dividends?

**Q4.** Mr. A wants to invest in the shares of PQR Co. The company declared a dividend of Rs. 40 per share last year. Calculate the value of a share if the required rate of return is 20% and the dividends are expected to grow at a constant rate of 15%?

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## 10.8 LET US SUM UP

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This unit introduces you to the purpose of investment and relevance of valuation of different securities using three step valuation process. It presents the significance and implication of the basic valuation model which states that the value of any security is simply the present value of the future benefits or future cash flows like interest, dividend, or earnings per period i.e., we discount the stream of cash flows at required rate of return. The chapter first discusses the valuation of bond or debenture including estimation of yield to maturity followed by valuation of redeemable and irredeemable preference share. Different methods of equity valuation have been explained such as Net asset value method, earning basis method which includes-Dividend yield method and earning capacity method, and dual method. Dividend discount model has been included covering one year holding period, multi-year holding period and indefinite holding period with no growth, constant growth and multiple growth rates. The concept and the valuation of convertible bond have also been discussed.

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## 10.9 KEY WORDS

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**Securities:** It includes shares, stock, bonds, debentures, debenture stock or other marketable securities of a like nature.

**Debenture/Bond:** It is an acknowledgement of a debt.

**Rate of Return:** It is also called ‘Discount Rate’. It is a rate used to calculate present value of future cash flows.

**Dividend Capitalization Approach:** Model used to value equity shares. According to it, the current price of a share is equal to the discounted value of all future dividends.

**Intrinsic Value:** The present value of the stream of benefits expected from an asset.

**Yield to Maturity:** The discount rate that equates the present value of interest payment and redemption value with the present price of a bond.

## 10.10 ANSWERS TO CHECK YOUR PROGRESS

- A 3.** The bond is worth ₹960.51 today. Therefore, the investor will be willing to pay a price of equal to or less than ₹960.51 for the bond today.
4. The value of the bond is ₹1049.
- B 3.** The value of equity is Rs. 100 when there is no growth in the dividends.
4. The value of equity is Rs. 920.

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## 10.11 SELF-ASSESSMENT QUESTIONS/EXERCISES

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- 1) What do you understand by Basic Valuation Model?
- 2) Explain various methods for the valuation of equity shares.
- 3) How will you calculate the value of a preference share?
- 4) Explain the Dual method for the valuation of shares.
- 5) How will you find the value of a perpetual bond?
- 6) what is meant by yield to maturity
- 7) What are the features of Bonds and explain them in detail.
- 8) What is the three-step valuation process
- 9) Define Bond and Types of bonds.
- 10) What Types of investors are interested in investing in debentures?

### Practical Problems

1. Mr. B wants to purchase a 9% preference share of Rs. 2000 redeemable after 3 years at a premium for Rs. 2500. What is the value of preference shares assuming that the required rate of return is 15%  
(Ans. ₹2054.726)
2. Mr. A has invested in an irredeemable preference share of Rs. 850. He receives a dividend of Rs. 60 annually. What is the value of preference shares assuming that the required rate of return is 10%?  
(Ans. ₹600)
3. PQR Ltd. has issued shares of ₹150 each, ₹144 paid up. The rate of dividend is declared by the company as 10%. The normal rate of return is 8%. Find the value of the share.  
(Ans. ₹180)
4. A company has employed equity capital of ₹20,00,000 of ₹100 each share fully paid up. It is an all-equity firm. The average profits of the company are ₹2,00,000 and the estimated rate of capitalization is 25%. Find Value as per earning capacity method.  
(Ans. ₹40)

5. If the value of the share as per the Intrinsic value method is ₹350 and as per the Yield method is ₹550 then find the value as per the fair value method.

(Ans. ₹450)

6. The current market price of a share is Rs. 200. The expected dividend is Rs. 10 per share and the expected price of share after one-year of Rs. 220. Calculate the value of the share and should it be bought at the current market price if the required rate of return is 10 %?

Ans. The value of equity is Rs. 209.0909 and hence the investor should buy it at the current market price of Rs. 200

7. Mr. A wants to invest in the shares of XYZ Co. for the next 7 years. The company is expected to declare a dividend of Rs. 20 per share at the end of every year for the next 7 years. The projected price of the share at the end of the seventh year is Rs. 400. Calculate the value of the share and should it be bought now at the current market price of Rs. 360, if the required rate of return is 10%?

Ans. The value of equity is Rs. 302.56 and hence the investor should not buy it at the current market price of Rs. 360.

8. Mr. A wants to invest in the shares of PQR Co. The company declared a dividend of Rs. 25 per share last year. The dividends of the company are expected to grow at a rate of 15% for the next five years and thereafter it is expected to grow at a rate of 17% p.a. forever. Calculate the value of the equity if the required rate of return is 15%

Ans. The value of equity shares is Rs. 898.5483 (approx.)

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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## **UNIT 11 CAPITAL STRUCTURE DECISIONS**

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### **Structure**

- 11.0 Objectives
- 11.1 Introduction
- 11.2 Types of Capital Structure
- 11.3 Features of an Appropriate Capital Structure
- 11.4 Establishing an Appropriate Capital Structure, EBIT-EPS Analysis
- 11.5 Factors Affecting Capital Structure
- 11.6 Optimal Capital Structure
- 11.7 Theories of Capital Structure
  - 11.7.1 Net Income Approach
  - 11.7.2 Net Operating Income Approach
  - 11.7.3 Traditional Approach
  - 11.7.4 Modigliani-Miller Approach
- 11.8 Let Us Sum-up
- 11.9 Key Words
- 11.10 Answers to Check Your Progress
- 11.11 Self Assessment Questions/Exercises

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### **11.0 OBJECTIVES**

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After studying the unit, you should be able to:

- understand the concept of capital structure;
- appreciate the types of capital structure and factors affecting them;
- describe various theories of capital structure;
- explain the importance of debt capital and equity capital; and
- discuss the effect of taxes on capital mix.

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### **11.1 INTRODUCTION**

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Capital Structure refers to mixture of owned and borrowed capital. It is the share of debt, preference and equity capital within the financing of firm's assets. The primary goal of financial management is to boost the value of the equity shares of the firm i.e. to maximize the wealth of the equity shareholders. Thus a firm is required to choose that financing mix that results in boosting the wealth of equity shareholders. A capital structure that maximizes the value of equity shareholders and minimizes the cost of capital

is called as an optimum capital structure. Value of a firm is dependent upon the earnings of a firm and its weighted average cost of capital. The value of the firm is derived by capitalizing the earnings by its cost of capital. Optimal capital structure is that combination of debt and equity that maximizes the total value of the firm or minimizes the overall cost of capital.

Capital structure is defined as the allocation of capital by the use of various long-term funding sources, which are divided into two categories: equity and debt. Equity shares, preference shares, retained profits, long-term debt, and other forms of funding may be collected by a corporation. These funds are used to keep the company going.

## **11.2 TYPES OF CAPITAL STRUCTURE**

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### **Horizontal Capital Structure**

The capital structure in which the proportion of debt component is zero is called as a Horizontal Capital structure. Thus the capital mix is of equity or retained earnings. Thus there is zero leverage.

### **Vertical Capital Structure**

In a vertical capital structure the capital comprises of only that portion of equity which is necessary to form an organization, rest by debt. Any incremental need for funds is met by issuing debt.

### **Pyramid Shaped Capital Structure**

In such a structure there is high proportion of equity as compared to debt. It is useful when the cost of equity is usually lower than the cost of debt .

### **Inverted Pyramid Capital Structure.**

It is the opposite of pyramid capital structure. In this, there is small proportion of equity as compared to debt.

## **11.3 FEATURES OF AN APPROPRIATE CAPITAL STRUCTURE**

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Every firm wants to have an appropriate capital structure. Each firm strives to have that level of debt-equity proportion which helps to maximize the market value of share and minimize the cost of capital. Following are the features of an appropriate capital structure:

### **1) Profitability**

A sound capital structure can allow for the most effective use of leverage at the lowest possible expense in order to improve performance and thereby maximise earnings per share.

### **2) Flexible**

A financial manager should be able to modify the firm's capital structure with a minimal expense if required. It should therefore be necessary for

the company to supply funding whenever required to support its productive operations.

### **3) Solvency**

Excessive debt jeopardizes the company's solvency and credit scores. Debt financing can be limited to the degree that it can be properly repaid.

### **4) Conservatism**

A company's debt capability can never be exceeded to the extent that it becomes difficult to service its debt. Both the interest and the principal balance must be paid on the debt. Future cash flows are expected to make these payments. Cash insolvency will lead to legal insolvency if potential cash flows are inadequate.

### **5) Control**

The capital structure should not be changed so much that it leads to loss of control in the company. The proportion of debt and equity thus be kept in such a manner that there is no loss of control.

## **11.4 ESTABLISHING AN APPROPRIATE CAPITAL STRUCTURE, EBIT-EPS ANALYSIS**

EBIT-EPS analysis is used as a tool to determine the optimal capital structure and to make a trade-off between risk and return. The financial manager looks at the EPS is looked at different levels of EBIT under different financing plans in order to gauge the risk and decide the level of return targeted. Let us understand it with the help of an example.

Big Star Limited, a software company, is planning its capital structure. Presently, it is a debt free company and has Rs. 10,00,000 equity in the capital structure. The numbers of outstanding equity shares are 40,000. In other words, the book value per share is Rs. 25. The business-forecasting group has provided the following estimates of sales and their respective probability levels, cost structure data in order to forecast the earnings before interest and tax (EBIT) :

Probability of EBIT	0.30	0.40	0.30
Sales revenues	Rs. 5,00,000	Rs. 10,00,000	Rs. 12,50,000
Less : Fixed Operating Cost	Rs. 2,00,000	Rs. 2,00,000	Rs. 2,00,000
Less : Variable operating cost (50% of sales)	Rs. 2,50,000	Rs. 5,00,000	Rs. 6,25,000
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000

The different levels of EBIT forecast indicate the kind of operating or business risk, the firm is exposed to and reflects the kind of variability the company has in its sales revenue and the degree of operating leverage it has

employed. The firm's choice of capital structure has an impact on its financial risk. The financial risk captures the ability of the firm to meet its debt obligations.

Let us consider that firm is considering the following debt levels in its capital structure. The money raised through debt will be used to buyback the equity.

Capital Structure Debt Ratio (1)	Level of Debt (2)	Interest Rate on all Debt (3)	Interest (2X3 = 4)
0%	0	0%	0
10%	Rs. 1,00,000	10%	Rs. 10,000
25%	Rs. 2,50,000	12%	Rs. 30,000
40%	Rs., 4,00,000	14%	Rs. 56,000
50%	Rs. 5,00,000	16%	Rs. 80,000

The associated capital structure to these debt ratios will be as under :

Debt ratio (1)	Total Assets (2) Rs.	Debt (3) Rs.	Equity (4) Rs.	Equity Shares Outstanding (4)/Rs. 25 (5)
0%	10,00,000	--	10,00,000	40,000
10%	10,00,000	1,00,000	9,00,000	36,000
25%	10,00,000	2,50,000	7,50,000	30,000
40%	10,00,000	4,00,000	6,00,000	24,000
50%	10,00,000	5,00,000	5,00,000	20,000

Let us see the impact of different debt ratios in capital structure on the EPS

Debt Ratio = 0%

Probability of EBIT	0.30	0.40	0.30
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000
Less : Interest	0	0	0
Earnings before tax	Rs. 50,000	Rs. 3,00,000	Rs. 4,50,000
Less : Taxes (35%)	Rs. 17,500	Rs. 1,05,000	Rs. 1,48,750
Earnings after taxes (EAT)	Rs. 32,500	Rs. 1,95,000	Rs. 2,76,250
	Rs. 0.8125	Rs. 4.875	Rs. 6.90625

**Financing Decisions**

Earnings per share (EAT/no. of equity shares)		Rs. 4.265625	
Expected EPS		Rs. 2.412	
Standard deviation of EPS			

Debt Ratio = 10%

Probability of EBIT	0.30	0.40	0.30
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000
Less : Interest	Rs. 10,000	Rs. 10,000	Rs. 10,000
	-----	-----	-----
Earnings before tax	Rs. 40,000	Rs. 2,90,000	Rs. 4,15,000
Less : Taxes (35%)	Rs. 14,000	Rs. 1,01,500	Rs. 1,45,250
	-----	-----	-----
Earnings after taxes (EAT)	Rs. 26,000	Rs. 1,88,500	Rs. 2,69,750
	Rs. 0.7222	Rs. 5.2361	Rs. 7.4931
Earnings per share (EAT/no. of equity shares)		Rs. 4.5590	
Expected EPS		Rs. 2.68	
Standard deviation of EPS			

**Financial and Dividend Decisions**

Debt ratio = 25%

Probability of EBIT	0.30	0.40	0.30
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000
Less : Interest	Rs. 30,000	Rs. 30,000	Rs. 30,000
	-----	-----	-----
Earnings before tax	Rs. 20,000	Rs. 2,70,000	Rs. 3,95,000
Less : Taxes (35%)	Rs. 7,000	Rs. 94,500	Rs. 1,38,250
	-----	-----	-----
Earnings after taxes (EAT)	Rs. 13,000	Rs. 1,75,500	Rs. 2,56,750
	Rs. 0.4333	Rs. 5.85	Rs. 8.5583
Earnings per share (EAT/no. of equity shares)		Rs. 5.0375	
Expected EPS		Rs. 3.216	
Standard deviation of EPS			

Debt ratio = 40%

Probability of EBIT	0.30	0.40	0.30
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000
Less : Interest	Rs. 56,000	Rs. 56,000	Rs. 56,000
	-----	-----	-----
Earnings before tax	(Rs. 6,000)	Rs. 2,44,000	Rs. 3,69,000
Less : Taxes (35%)	(Rs. 2,100)	Rs. 85,400	Rs. 1,29,150
	-----	-----	-----
Earnings after taxes (EAT)	(Rs. 3,900)	Rs. 1,58,600	Rs. 2,39,850
	(Rs. 0.1625)	Rs. 6.6083	Rs. 9,99,375
Earnings per share (EAT/no. of equity shares)		Rs. 5.5927	
Expected EPS		Rs. 4.02	
Standard deviation of EPS			

Debt ratio = 50%

Probability of EBIT	0.30	0.40	0.30
EBIT	Rs. 50,000	Rs. 3,00,000	Rs. 4,25,000
Less : Interest	Rs. 80,000	Rs. 80,000	Rs. 80,000
	-----	-----	-----
Earnings before tax	(Rs. 30,000)	Rs. 2,20,000	Rs. 3,45,000
Less : Taxes (35%)	(Rs. 10,500)	Rs. 77,000	Rs. 1,20,750
	-----	-----	-----
Earnings after taxes (EAT)	(Rs. 19,500)	Rs. 1,43,000	Rs. 2,24,250
	(Rs. 0.975)	Rs. 7.15	Rs. 11.2125
Earnings per share (EAT/no. of equity shares)		Rs. 5.93125	
Expected EPS		Rs. 4.824	
Standard deviation of EPS			

The expected level of EPS and their standard deviation at different levels of debt ratios is as under :

Debt Ratio	Expected EPS	Standard Deviation of EPS
0%	Rs. 4.27	Rs. 2.41
10%	Rs. 4.56	Rs. 2.68
25%	Rs. 5.04	Rs. 3.22
40%	Rs. 5.59	Rs. 4.02
50%	Rs. 5.92	Rs. 4.82

From the foregoing example, it has clearly emerged that increase in debt ratio though increases the expected level of EPS but at the same time, it makes EPS volatile. The use of financial leverage has a negative impact when the ROA is less than the cost of debt, as it is evident from debt ratio of 40% and 50% at EBIT level of Rs. 50,000.

## 11.5 FACTORS AFFECTING CAPITAL STRUCTURE

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Capital structure is affected by various factors that are either internal or external to the organization. Various factors affecting the capital structure are as follows:

- 1) **Nature and Size of business:** The capital structure of a company is strongly determined by its scale. Since trading companies need more operating capital, they collect capital by issuing equity and preference shares. Small businesses have a restricted ability to collect capital from outside investors. Large firms have a lot of money to spend, so they will issue debentures by selling fixed asset securities like property, buildings, and so on. Small businesses usually have to rely on the owner's funds, but as they expand, they may be able to obtain long-term funding and larger businesses are seen as less risky by investors.
- 2) **Stages of business:** Since a company will not be able to get finance by issuing variety of securities in the early stages of operation due to the high risk involved, it is better to collect capital by equity shares. The firm may later issue other forms of shares and fixed interest bearing debentures and so on, for expansion or modernization. Companies with volatile profits (unpredictable cash flow) should avoid using leverage in their financial structure so they can struggle to cover the fixed interest rate.
- 3) **Period of funding:** The 'period for which funding is needed' must also be addressed when designing capital structure. If money is needed on a regular basis, the company can issue equity shares to collect the funds. Funds may be obtained over a shorter period of time by issuing debentures or preference shares.
- 4) **Management's desire for control:** The mindset of those in management has an effect on capital structure. If management wants to have complete leverage, it will raise money by preference shares and debt. Since the owners of those shares has no voting powers. They are unable to influence the company's executives.
- 5) **Taxation:** Dividends are not considered a tax free cost for the company, whereas interest charged on debt is. As a result, issuing debt capital is preferred to issuing share capital. Debt capital is used by businesses with higher taxes because it is a tax deductible expense.

## 11.6 OPTIMAL CAPITAL STRUCTURE

An optimal capital structure is the one that has the best mix of debt and equity financing that maximizes the market value of the company and minimizes its cost of capital. In fact a company would focus to minimize its weighted average cost of capital so that funds can be acquired at the lowest cost. However, some economists also assert that if there are no taxes, agency cost and efficient flow of information then the value of firm will not be affected by its capital structure. But in real word there are taxes, agency cost and asymmetric information,. Therefore, one needs to have an optimal capital structure that minimizes the overall cost. However, it is difficult to arrive at a particular mix of debt and equity and call it as an optimal.

### Check Your Progress A

- 1) What do you mean by capital structure?

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.....  
.....

- 2) List the factors which influence capital structure of a firm.

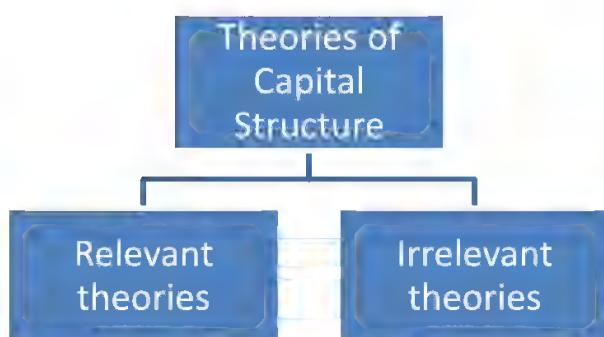
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- 1) What are features of an appropriate capital structure?

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.....  
.....

## 11.7 THEORIES OF CAPITAL STRUCTURE

There are a few contending capital structure theories, some theories propagates that capital structure decisions are very important as they affect the value of firm, therefore, capital structure is relevant. On the other hand ,some theories asserts that capital structure is irrelevant as it does not affect the value of firm.



Some of the capital structure theories are

- 1) Net Income Approach
- 2) Net Operating Income Approach
- 3) Modigliani-Miller (MM) Approach,
- 4) Traditional Approach

All these capital structure theories are based on certain assumptions. These are as follows:

- There are only two types of funding available: debt and equity. There are no other forms of funding such as preference share capital and retained earning.
- The firm will pay all its earning as dividends. Thus dividend payout ratio is 1.
- There is no cost of floatation and no transaction cost .
- The firm has perpetual life.
- All investors are rational. So, all investors want to maximize their return with minimization of risk.
- both cost of debt, and equity are independent of capital structure.
- No change in investment decisions of the firm. i.e. no change in total assets.
- Firm's total financing remains constant but the proportion of debt and equity may change.

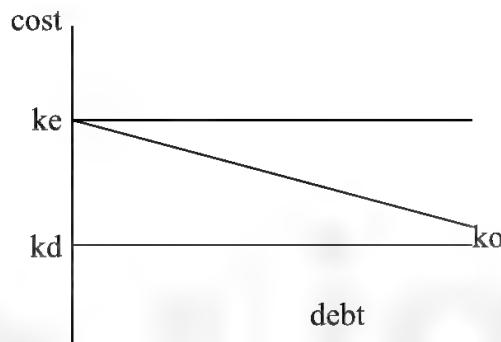
### **11.7.1 Net Income Approach**

The Net Income (NI) approach given by David Durand suggests that there is relationship between the company's capital structure and value. The relevancy of capital structure was suggested in terms that a change in capital structure will eventually lead to a change in the value of the firm. This approach suggests that the company's value can be increased by lowering the total capital cost (WACC) through higher debt ratio. Simply put, the organization may affect its valuation by increasing or decreasing the debt ratio in its financing mix.

Net Income approach has following additional assumptions;

- There is no tax. The firms are not required to pay any corporate tax.
- Cost of debt is always lesser than cost of equity ( $K_d < K_e$ )
- Capital market is perfect, it means information about all companies are available to all investors and there are no chances of over pricing or under pricing of security. Further it means that all investors are rational. So, all investors want to maximize their return with minimization of risk.
- The use of debt does not alter the risk perception for creditors and will remain the same throughout.

The net income approach suggests that as the proportion of debt increases in the capital structure the overall cost of capital will decrease. This is so because debt is a cheaper source of funds than equity. Therefore more leverage implies having more or less costly capital source than equity. Thus a firm's capital structure is important. With judicious mix of debt and equity a firm can achieve an optimum capital structure to minimize the overall cost of capital. Thus net income approach suggests that for any given level of EBIT a firm will have Maximum value when its WACC is minimum. And since the cost of debt is lesser than cost of equity therefore WACC will be minimum when the capital structure is made up of total debt financing.(remember it is not feasible to have a capital structure of 100% debt)



Total Value Of The Firm As Per Net Income Approach	
EBIT	Net operating Income (given)
Less-Interest	Value of debenture × Rate of Interest (Kd)
EAT (Assumption of no corporate taxes)	Earning available to equity share holders/Net Income
Market value of equity	NI/Ke
Market Value of Debt	Interest/Ki
Total Market Value of Firm	Value of equity + Value of Debt

**Illustration 1:** A firm is expected to have an EBIT of ₹500,000. It issued equity share capital having cost of equity @ 10%. Calculate the Value of Firm and WACC given in .1 and it has 5% debentures of

- Case 1-₹5,00,000
- Case 2-₹10,00,000
- Case 3-₹15,00,000

**Solution:**

	CASE 1 (₹)	CASE 2 (₹)	CASE3 (₹)
EBIT	5,00,000	5,00,000	5,00,000
Less: Interest	25,000	50,000	75,000

EBT	4,75,000	4,50,000	4,25,000
Less: Tax (No Tax Assumption)	Nil	Nil	Nil
Earning available for equity share holders (= EBT)	4,75,000	4,50,000	4,25,000
K <sub>e</sub> (Given)	0.1	0.1	0.1
Value of Equity (EBT/K <sub>e</sub> )	47,50,000	4500000	42,50,000
Value of Debt (Given)	5,00,000	1000000	15,00,000
Value of firm (Value of Debt + Equity)	52,50,000	5,500,000	57,50,000
WACC (K <sub>o</sub> = EBIT/Value of firm)	0.095	0.091	0.087

As we have seen that one of the assumption in net income approach is of no taxes. Therefore, taking taxes as nil , the EBT will be equal to the amount available for equity shareholders. We can see that as the amount of debt financing is increasing the capital mix the WACC i.e overall cost of capital(k<sub>o</sub>) is reducing. **Thus capital structure is relevant as per net income approach. And as per this approach the optimal capital structure would be 100% debt financing.**

### 11.7.2 Net Operating Income Approach

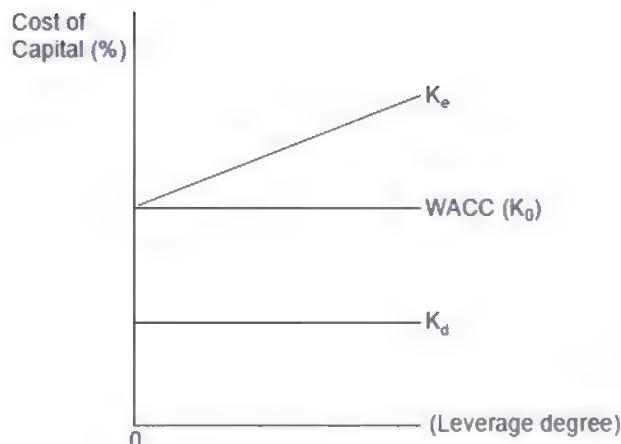
The net operating approach has following additional assumptions

- There is no tax. The firms are not required to pay any corporate tax.
- Cost of debt is always constant.
- Overall cost of capital i.e K<sub>o</sub> will remain constant for any degree of leverage. The value of the firm, given the level of EBIT, is determined by  $V = EBIT/k_o$
- Increase in debt will increase the risk perception of equity shareholders resulting in an increase in cost of equity(K<sub>e</sub>).

The net operating income approach propagates that a capital structure is irrelevant. As per this approach total value of the firm is not affected by the capital mix of debt and equity. This approach is based on the proposition that as more and more leverage is used in the capital structure, the equity risk increases and this results in an increase in the capital cost of equity(K<sub>e</sub>). This increase in the K<sub>e</sub> would be at a level that would have a complete impact on the benefit of cheaper debt. Thus for a known value of EBIT, the value of the firm remain the same regardless of the the proportion of debt and equity in the capital structure .Thus the finance mix is irrelevant and does not affect the value of the firm. Instead it depends on the overall cost of capital.

The value of the equity will be calculated by deducting the value of the debt from the overall value of the company.

Accordingly, as per the NOI approach, the valuation of the company remains the same in all forms of debt-equity combinations. The cost of equity,  $k_e$ , will change linearly with the increase in the debt ratio, as the risk perception of shareholders will change due to the change in the debt-equity mixture.



**Illustration 2 :** A firm is expected to have an EBIT of ₹500,000. The overall cost of capital of the firm is 10%. Calculate the value of Firm and cost of equity it has 5% debentures of

- Case 1-₹5,00,000
- Case 2-₹10,00,000
- Case 3-₹15,00,000

	CASE 1 (₹)	CASE 2 (₹)	CASE3 (₹)
EBIT	500000	500000	500000
Less: Interest	25000	50000	75000
EBT	475000	450000	425000
Less: Tax (No Tax Assumption)	Nil	Nil	Nil
Earning available for equity share holders (= EBT)	475000	450000	425000
Overall Cost of Capital( $K_o$ ) (Given)	0.1	0.1	0.1
Value of firm (EBIT/ $K_o$ )	5000000	5000000	5000000
Value of Debt (Given)	500000	1000000	1500000
Value of Equity (Value of firm-Value of Debt)	4500000	4000000	3500000
Cost of Equity ( $K_e = EBT/Value of equity$ )	0.106	0.113	0.121

Thus we can see that as the proportion of debt has increased in the capital structure, the cost of equity has also increased. But the overall cost of capital

being same at all levels total value of the firm is same at all levels.Hence The capital structure is irrelevant.

### **11.7.3 Traditional Approach**

The NI approach and the NOI approach have extreme views on the relationship between the capital structure, the capital cost and the valuation of the firm.Thus traditional approach is a compromise between the above two approaches.Thus as per this approach the value of firm increases and cost of firm decreases with increase in the proportion of debt upto a certain level.And after reaching this certain level, the further increase in the proportion of debt capital will change the risk perception of investors and equity shareholders will demand more return for any further increase in debt capital.Thus the cost of capital will increase and value of firm will decline after that certain level.

So as per traditional approach , initially the value of can be increased and the cost of capital can be decreased by using more debt as debt is a cheaper source than equity.So by judicious mix of debt and equity a firm can reach to an optimum capital structure.But once the optimum capital structure is reached, then after this point any further increase in the debt capital will increase the risk perception of equity shareholders and thus the cost of equity increases.So as per this approach there exists a combination of debt and equity which is optimum.

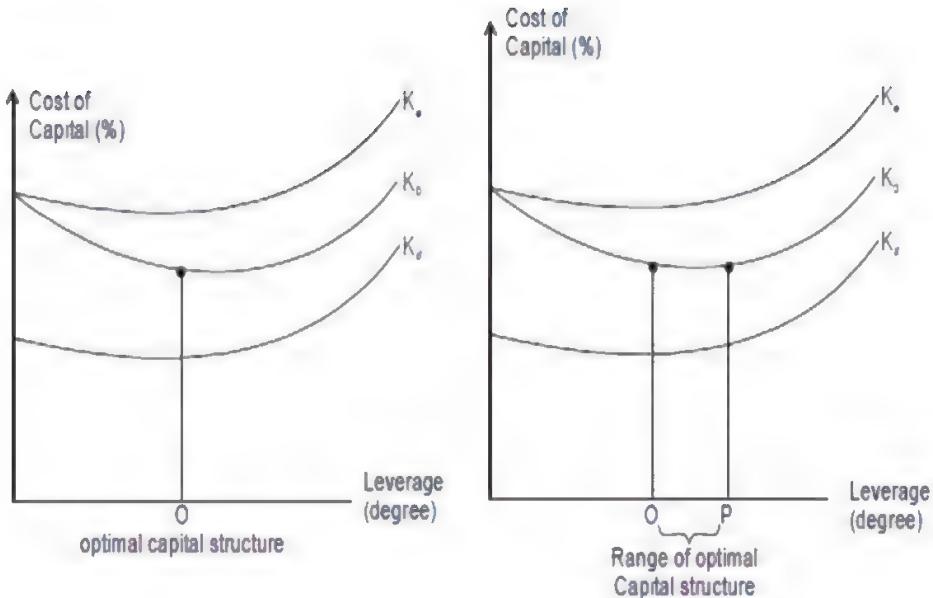
There is also an other variant of this approach which suggests that rather than a single capital structure ,there exists a range of capital structure which is optimum.This can be understood as follows.

First, use of more debt will not affect the cost of equity.The Ke remains constant or rises so lightly that it doesnot offset the benefit of cheaper debts.Thus at first increase in debt capital will result in a decrease in the overall cost of capital ( $k_o$ ) and increase the value of the firm.

Second, now as the firm reaches a certain level of leverage then there is a range in which capital structure is optimal i.e. that further increase in leverage will have a negligible effect on overall cost of capital and firm's value in this range.

Third, beyond the certain limit any further increase in leverage will increase the financial risk perception of investors so much that there will be increase in the cost of equity due to more financial risk. This higher equity capitalization rate will exceed the benefits of cheaper debts in such a way that ultimately the value of firm will decrease and overall cost of capital will increase with the leverage.

Traditional approach is also called as the ‘intermediate approach’.



#### 11.7.4 Modigliani-Miller Approach

Modigliani-Miller approach (MM approach) is similar to the Net Income approach. MM approach is also a theory regarding the irrelevancy of capital structure which was given in 1950. It suggests that overall cost of capital of a firm is not affected by the degree of leverage. That is the value of the firm is solely dependent on the operating profits of the company.

Assumptions of MM Approach are as follows

- Capital market is perfect, it means information about all companies are available to all investors
- Securities are infinitely divisible.
- All investors have the same expectation of the company's net operating income for the purpose of evaluating the value of the firm.
- 100% dividend payout ratio.
- Personal leverage and corporate leverage are a perfect substitute.
- Investors rationally choose the most advantageous combination of risk and return for them.

But this approach can be understood in following two cases

- 1) Without taxes
- 2) With Taxes

##### **MM Approach –Without taxes**

Under this assumption of no corporate taxes to be paid by firm, this approach says that the company's value is not affected by its capital structure. The cost of equity will increase with increase in the debt proportion due to increased risk perception of equity shareholders. And thus the value of levered firm (firm having debt in its capital mix) will be equal to the value of an all equity firm. Thus the benefit of cheaper debts will be set off by the corresponding rise in the cost of equity.

To prove this point Modigliani and Miller gave an arbitrage mechanism. Arbitration is a method of buying security in a market where the price is lesser and selling it in a market where the price is higher. Thus resulting in ultimately equating the price of securities.

This method is a balancing operation which ensures that security cannot be sold at different prices. For this they assumed that there are two firms. One is levered i.e. having debt and equity both. Other firm is an unlevered firm i.e. having only equity in its capital. The levered and the unlevered firm are same in all aspects except the point of leverage.i.e. presence of debt capital in the capital structure. As per MM Approach if the market value of levered and unlevered firms are different, then arbitrage process will take place. The investors will keep switching to the firm giving more returns until both the firms provide same returns. This can be explained with the help of following example:

Suppose there are two firms-Firm L (levered firm) and Firm U (Unlevered firm) with following capital structure:

	Firm L (₹)	Firm U (₹)
Equity Capital	20,00,000	3000000
6% Debentures	20,00,000	Nil
EBIT	1000000	10,00,000

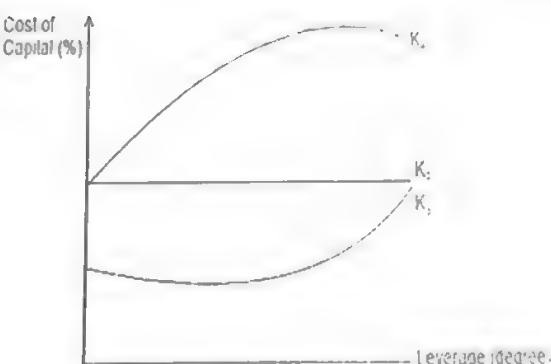
Suppose an investor holds 10% equity shares in levered firm. Thus he is having shares of ₹ 200000. And he will get return of ₹88000[10% of (10,00,000-120000)].

Now if this investor would have invested in 10% of equity shares of unlevered firm then it would have earned him ₹1,00,000.

Now this investor can have this alternative that he sells his 10% shareholding in Firm L for ₹200000 and takes a personal loan of Rs 2,00,000 @6%. With this money he will buy 10% shares of Firm U for Rs 3,00,000.

Now with this investment he will get a return of ₹100000. From this he will pay ₹12000 as interest on loan. Thus net return will be ₹88000. And also he still has with him of ₹1,00,000 as cash.

This way the gradual rise in the sale of shares of levered firm and purchase of shares of unlevered firm by investors will create a buy and sell pressure. This arbitrage will continue until both the firms have equal market value.



The figure above provides a view of the capital structure, where the overall cost of capital is stable at all rates of leverage, and the increase in the cost of equity is almost sufficient to account for the use of low-cost debt financing.

Thus under MM'S **proposition I** for a firm in the same risk class, the market value of firm is independent of Debt Equity Mix.

i.e. Value of levered firm = Value of Unlevered Firm

Also Value of firm = Net operating Income/Overall Cost of Capital.

## PROPOSITION II

Under proposition II the cost of equity is taken as a linear function of the firms debt equity ratio. That is as the degree of leverage increases in the firm then the required rate of return by equity shareholders also increases to offset the benefit of using cheaper debts.

Thus, Cost of Equity in levered firm( $k_{eL}$ )= Cost of Equity in Unlevered firm ( $K_{eUL}$ ) + Premium for financial risk ( $D/E(K_{eUL}-K_o)$ )



However there are certain criticism of MM theory. These are;

- Personal and corporate leverage can't be perfect substitutes
- Transaction costs interfere with the working of arbitrage which was assumed to be not present.
- Existence of corporate taxes
- In practical life, capital markets are not perfect.
- Interest paid to debt holders is a tax deductible expense.

## MM Approach-With Taxes

In the presence of taxes, proposition I will change as follows:

Value of levered firm ( $V_L$ ) = Value of unlevered firm ( $V_{UL}$ ) + amount of tax shield. ( $T \times \text{int}$ )

In a taxable scenario the levered firm will have the advantage of deducting interest from EBIT before paying taxes on Earnings. Thus tax liability will reduce by the amount of such shield.

Under Proposition II i.e when cost of equity is taken as a linear function of the firm's debt equity ratio, this relationship will be as follows

$$K_{eL} = k_{eUL} + D/E [(K_{eUL} - K_d)(1-T)]$$

Thus, the MM theory suggests that the optimum capital structure is one that has calculated the ideal amount of debt at a point / range where the total cost of capital is negligible. Extreme debt utilization exposes the business to higher default probabilities, which result in increased financial risk and may reduce the value of the firm. There is therefore a safe limit to the use of debt, and firms should not use debt beyond that limit / point. There is therefore an ideal capital structure.

### **Check Your Progress B**

**Q1. Choose the correct Answer.**

- 1) Which of the following is an assumption of Modigliani-Miller approach?
  - a) Capital market is perfect
  - b) Securities are infinitely divisible
  - c) 100% dividend payout ratio
  - d) All of the above
- 2) Which of the following approach suggests judicious use of leverage.
  - a) MM Approach
  - b) Net Income Approach
  - c) Traditional Approach
  - d) None of the above.
- 3) ..... approach pronounces that the overall capitalization rate and the cost of debt remain constant for all degrees of leverage.
  - a) MM Approach
  - b) Net Income Approach
  - c) Traditional Approach
  - d) None of the above.
- 4) The tax savings of the firm derived from the deductibility of interest expense is called the
  - a) Interest rate
  - b) Interest earnings
  - c) Interest tax shield
  - d) None of the above
- 5) Which of the following approach assumes that change in the degree of leverage will alter the WACC.
  - a) Net Income Approach
  - b) Net operating Income Approach
  - c) Both a and b
  - d) Neither a nor b

Capital Structure refers to mixture of owned and borrowed capital. There are various kinds of capital. The company whose owners want to share maximum amount of capital will have more amount of equity in its capital structure. The capital structure should be profitable, flexible, and able to service debt and should not lead to much loss of control for owners. There are various factors that affect a capital structure. One must decide the mix of debt and equity keeping the mind the various factors. Various capital structure theories are there in financial management which serves as a systematic approach to financing business activities. These theories explore the association between debt financing ,equity financing and market value of the firm. Knowledge of these theories also help in present times in accurate analysis of capital structure and find optimal mix of capital and thus improve profitability.

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## **11.9 KEY WORDS**

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**Capital Structure:** The proportion of debt and equity in the capital structure

**Optimal capital Structure:** The best mix of debt and equity in the capital structure that maximises the market value of the company.

**EBIT:** Earnings before interest and taxes

**EPS:** Earning per share

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## **11.10 ANSWERS TO CHECK YOUR PROGRESS**

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B. 1. d; 2. c; 3. b; 4. c; 5. a

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## **11.11 SELF ASSESSMENT QUESTIONS/EXERCISES**

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- 1) Define Capital structure. What do you mean by optimal capital structure?
- 2) Differentiate between Net Income approach and net operating income approach.
- 3) What are the general assumptions in capital structure theories?
- 4) Explain the Net operating Income approach to capital structure.
- 5) What are different types of approaches to capital structure?
- 6) What is the best capital structure as per Net Income approach?
- 7) Discuss the effect of corporate taxes on corporate valuation? How does the MM approach integrate corporate taxes into the valuation model?
- 8) ABC Ltd has 10% debentures of ₹12,00,000 in its capital structure. Another company XYZ Ltd has 10% debenture of ₹10,00, 000. Both the companies have EBIT OF 5,00, 000. The equity capitalization rate is 15%. As per Net Income approach find Value of the firm .

(ABC Ltd. Value of firm = ₹37,33,333 , XYZ value of firm = ₹36,66,667)

- 9) XYZ Ltd. has 18% debentures of ₹15,00,000 in its capital structure. It has EBIT of ₹25,00,000. The equity capitalization rate is 11%. As per Net Income approach find the Value of the firm and overall cost of capital.  
(Value of firm = ₹21772727)
- 10) ABC company is having EBIT of ₹5,00,000. The company is also having 6% debentures of ₹3,00,000. The overall cost of the company is 9%. Find equity capitalization rate and value of firm under NOI approach  
(equity capitalization rate = 9.17%, Value of firm = ₹55,55,556)
- 11) ABC company is having EBIT of ₹2,00,000. The company is also having 10% debentures of ₹6,00,000. The overall cost of the company is 20%. Find equity capitalization rate under NOI approach.  
(equity capitalization rate = 35%)
- 12) Two firms are having EBIT of rupees thirty thousand. Firm I is having 90,000 equity shares having market price of ₹1.50. and 10% debentures of ₹60000. Firm II is an all equity firm having 1,50,000 equity shares whose market price is ₹1 per share. There are no retained earnings. Using the concept of MM Approach, Explain with reason if an investor holding 10% of share in Firm I will be better off in switching his holding to Firm II.  
(Yes ,he will be better off)
- 13) ABC is an unlevered firm having total assets of ₹40,00,000. This company is an all equity firm. The equity capitalization rate is 10%. This firm has an EBIT of ₹10,00,000 and is subject to corporate tax of 30%. What is the value of the firm.  
(₹7000000)

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 12 LEVERAGE:OPERATING, FINANCIAL AND COMBINED**

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### **Structure**

- 12.0 Objectives
  - 12.1 Introduction
  - 12.2 Leverage
  - 12.3 Operating Leverage
    - 12.3.1 Degree of operating leverage
  - 12.4 Financial Leverage
    - 12.4.1 Degree of financial leverage
  - 12.5 Relation with Break-Even Analysis
    - 12.5.1 Changing Costs and the Operating Breakeven Point
  - 12.6 Combined Leverage
    - 12.6.1 Degree of Combined Leverage
  - 12.7 Let Us Sum Up
  - 12.8 Key Words
  - 12.9 Answers to Check Your Progress
  - 12.10 Self-Assessment Questions/Exercises
- 

## **12.0 OBJECTIVES**

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After studying this unit, you should be able to:

- explain the concept and relevance of leverage;
- discuss various types of leverages;
- compute financial leverage, operating leverage and combined leverage;
- discuss the significance of financial leverage, operating leverage and combined leverage; and
- discuss the limitation of use of leverage.

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## **12.1 INTRODUCTION**

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The capital is needed when the firm starts its business or expand it. The capital which can be raised through various sources like equity shares, preference shares, debentures and loans from banks and financial institutions. Debt has two advantages like fixed payment and tax deductibility due to which cost of debenture is lowest as compared to equity and preference shares. Another advantage of debentures is that if the company earns huge profits, in that case also the same interest has to be paid. However in case of

bad times when the company profit fall short and is not able to cover the interest charges then its shareholders will have to cover up the loss. Thus in case of loss, the loss per share of equity shareholder further increases. Companies with variable earnings and operating cash flow restrict the use of debts. On the other hand the firm having more stable earning and cash flows can use more debt in their capital structure. Hence, earning per share is an important indicator of financial performance and how earnings per share is influenced by changes in output or earnings. To understand this relationship, we analyse leverage. In this unit, you will learn about meaning, significance and types of leverages and also how to calculate them.

## **12.2 LEVERAGE**

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Leverage means firm's ability to use fixed cost capital like debenture, loans from banks and financial institutions along with owners capital i.e., equity shares or the use of fixed interest bearing capital with variable interest capital. Leverage helps to pull the return to the shareholders or owner as the use of fixed interest- Bearing capital along with variable capital i.e., equity helps to increase EPS i.e., Earning per share

Leverage is a double edged weapon as in case of profit it is beneficial. When the company earns profit then it is in the position to pay interest as by using fixed interest bearing capital, the debentures, the overall cost of capital decreases as they are cheaper source as compared to equity, more return can be paid to equity shareholders. But in case of loss as it is the fixed burden on the part of company, interest on debenture has to be paid to the debenture holders. Therefore, at the time of loss it will further increase loss. We have to use the debentures and loan with due care. Thus use of fixed income securities such as debenture and preference share capital along with equity capital is known as financial leverage. If the firm is financed entirely through the equity shares, a change of certain percentage of EBIT will lead to same percentage change in EPS. By using leverage EPS can be increased in greater proportion.

Leverage can be broadly classified into three categories:

- i) Operating leverage;
- ii) Financial leverage; and
- iii) Combined leverage.

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## **12.3 OPERATING LEVERAGE**

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The use of fixed cost in the total cost is operating leverage. If the cost structure of company is such that it only has variable cost then the change in sales would lead to same percentage change in profit. On the other hand if company uses some fixed cost then the change in sales would result in greater change in profit .This is due to the fact that fixed cost remain same and variable cost changes in the same proportion as the sales. Thus operating leverage is the level to which fixed costs are used in firm's capital structure.

Operating leverage is a function of three factors :

Leverage: Operating,  
Financial and  
Combined

- 1) Fixed costs
- 2) Contribution
- 3) Volume of sales

The operating costs of a firm fall into three categories:

- 1) Fixed costs: It is defined as those costs which do not vary with change in sales. They must be paid regardless of the amount of revenue earned through sales. Example – rent, lease and salaries etc.
- 2) Variable costs, which vary directly with the change in sales. Examples hourly wages, sales commission, utilities like electricity and water.
- 3) Semi-variable or semi-fixed costs are those, which are partly fixed and partly variable. The operating leverage occurs anytime a firm has fixed costs that must be met regardless of the volume.

Operating leverage (OL) can be calculated by using the following formula :

$$OL = \frac{\text{Contribution}}{\text{EBIT}} \text{ Or } \frac{\text{Sales} - \text{Variable Cost}}{\text{EBIT}}$$

If contribution is more than fixed cost, it is favourable operating leverage. In case of vice-versa, it is unfavourable operating leverage.

#### Illustration 1:

Selling price per Unit : Rs. 40

Variable Cost per Unit : Rs. 20

Actual Sales : 300 units

Installed capacity : 500 units

Calculate operating leverage in each of the following situations, using the above information.

- i) when fixed costs are Rs. 2,000
- ii) when fixed costs are Rs. 1,800

#### Solution:

#### Operating Leverage

Particulars	Situation (i) (Rs.)	Situation (ii) (Rs.)
Sales : $(300 \times 40)$	12,000	12,000
Less : Variable Cost $(20 \times 300)$	6,000	6,000
Contribution	-----	-----
Less : Fixed costs	6,000	6,000
	2,000	1,800
	-----	-----

Earning before interest and tax (EBIT)	4,000	4,200
Operating Leverage	$6,000 \div 4,000$ = 1.5	$6,000 \div 4,200$ = 1.43

Here you can note that operating leverage is affected by increase or decrease in fixed cost.

### Significance of Operating Leverage

- 1) The higher the fixed expenses more will the profit with every increase in sale volume. As the fixed cost will get divided among larger number of units.
- 2) It helps to understand the level of fixed cost which is invested in the operating expenses of business activities.
- 3) High degree of operating leverage magnifies the effect on earning before interest and taxes EBIT for a small change in the sales volume.
- 4) It affects capital structure and return on total assets.
- 5) With increase in sales there will be more increase in profits of the business that has operating leverage. And thus shareholders will get more return on equity(ROE).

### Disadvantages

#### 1) Liquidity Issues

The company having more fixed payment obligations may find it difficult to meet the obligations when company is in recession or depression period. This may lead to hard times for the company and it may face liquidity issues.

#### 2) Higher break even point

Higher fixed costs shift the break even point of the company to higher level of sales volume.

### 12.3.1 Degree of Operating Leverage

The behaviour of operating leverage can be measured by the degree of operating leverage. The degree of operating leverage (DOL) is a ratio that determines how much a company's operating income can fluctuate in relation to changes in sales. Companies with a high portion of fixed costs (costs that do not change with production volume) than variable costs (costs that change with production volume) have higher degree of operating leverage.

$$DOL = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}} = \frac{\text{New EBIT} - \text{old EBIT}}{\text{old EBIT}} \div \frac{\text{New Sales} - \text{old sales}}{\text{old sales}}$$

Where,

EBIT = earnings before interest and tax.

Other ways to find degree of Operating Leverage is

$$DOL = \frac{\% \text{Change in operating Income}}{\% \text{Change in Sales}}$$

**Leverage:Operating,  
Financial and  
Combined**

$$DOL = \frac{\text{Contribution Margin}}{\text{Operating Income}}$$

$$DOL = \frac{\text{Contribution}}{\text{EBIT}}$$

$$= \frac{\text{Change in EBIT/EBIT}}{\text{Change in Sales/Sales}}$$

DOL decreases with every level of sales increase. Positive DOL indicates that a firm is operating above Break Even Point.

### Illustration 2:

Selling price per unit : Rs. 30

Variable cost per unit : Rs. 14

Sales : 200 units

Fixed cost : Rs. 2,000

Calculate the degree of operating leverage if sales are :

- a) 150 units b) 250 units and c) 300 units

### Solution:

Computation of degree of operating leverage.

Particulars	Present Position	Situation 1	Situation 2	Situation 3
Sales Units	200	150	250	300
Sales Rs. 30/unit	6,000	4,500	7,500	9,000
<b>Less : variable cost Rs. 14/unit</b>	<b>2,800</b>	<b>2,100</b>	<b>3,500</b>	<b>4,200</b>
Contribution	3,200	2,400	4,000	4,800
<b>Less : Fixed cost</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>	<b>2,000</b>
EBIT	1,200	400	2,000	2,800
<b>OL = <math>\frac{\text{Contribution}}{\text{EBIT}}</math></b>	<b>2.66</b>	<b>6</b>	<b>2</b>	<b>1.71</b>
<b>DOL = <math>\frac{\text{Change in EBIT/EBIT}}{\text{Change in Sales/Sales}}</math></b>		$\frac{800 \div 1,200}{2,500 \div 6,000}$ $.67$ $.42$	$\frac{800 \div 1,200}{1,500 \div 6,000}$ $.67$ $.25$	$\frac{1,600 \div 1,200}{3,000 \div 6,000}$ $1.33$ $0.5$
<b>DOL</b>		1.59	2.68	5.3

You note here that a small change in sales will have large effect on operating income. Degree of operating leverage is positive beyond the operating break-even point and it is negative below break-even point.

### Illustration 3:

Calculate Degree of Operating Leverage for three different firms X, Y and Z from the following information

<b>Particulars</b>	<b>X (Figure in Rs.)</b>	<b>Y(Figure in Rs.)</b>	<b>Z(Figure in Rs.)</b>
Selling price per unit	200	320	500
variable cost per unit	60	160	200
Fixed cost	6,00,000	4,00,000	10,00,000
sales in units 50,000			

### Solution:

(figures in Rupees)

Particulars	X	Y	Z
sales	$(50,000 \times 200 \text{ units})$ 1,00,00,000	$(50,000 \times 320 \text{ units})$ 1,60,00,000	$(50,000 \times 500 \text{ units})$ 2,50,00,000
<b>less: Variable cost</b>	$(60 \times 50,000)$ 30,00,000	$(160 \times 50,000)$ 80,00,000	$(200 \times 50,000)$ 1,00,00,000
Contribution	70,00,000	80,00,000	1,50,00,000
<b>less: Fixed Cost</b>	6,00,000	4,00,000	10,00,000
EBIT	64,00,000	76,00,000	1,40,00,000
Operating Leverage:			
contribution/EBIT	$70,00,000/64,00,000$ 1.093 times	$80,00,000/76,00,000$ 1.052 times	$1,50,00,000/1,40,00,000$ 1.071 times

### Check Your Progress A

- 1) What is operating leverage?

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- 2) What is the formula to calculate degree of operating leverage?

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## 12.4 FINANCIAL LEVERAGE

Financial leverage occurs when firm uses debt funds along with equity capital. It is the ratio of fixed interest bearing capital to variable interest Capital. A firm is said to be a levered firm when it's capital structure includes

fixed interest capital also like debentures and loans. The financial leverage can be calculated as follows :

Leverage:Operating,  
Financial and  
Combined

$$\text{Financial leverage} = \frac{\text{EBIT}}{\text{EBT}}$$

Where EBIT = Earning before Interest and tax

EBT = Earning Before Tax

Low ratio means lower borrowing and low interest burden. Low ratio is less risky but less profitable also. Higher ratio indicates higher interest burden and is consequently more risky. Thus, financial leverage indicates use of fixed interest bearing securities in a capital structure with a very purpose of increasing the shareholder's return or earning per share which ultimately leads to attain the objective of wealth maximization.

### 12.4.1 Degree Financial Leverage

The behaviour of financial leverage may be measured by the degree of financial leverage. A degree of financial leverage (DFL) is a ratio that calculates a company's earnings per share (EPS) in response to increases in operating income as a result of capital structure changes. The degree of financial leverage (DFL) is a metric that calculates the change in EPS as a percentage of a change in net income, also known as earnings before interest and taxes (EBIT). It may be presented as:

$$\frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

where EPS can be determined as

$$\frac{(EBIT - I)(1 - t) - DP}{N}$$

Where EBIT = Earning before interest and taxes

I = Interest

T = tax

DP = Preference dividend

N = Number of equity shares

$$\text{Degree of Financial leverage} = \frac{(EBIT)}{EBIT - I}$$

$$\frac{\text{New EBT} - \text{old EBT} \div \text{old EBT} \times 100}{\text{New EBIT} - \text{old EBIT} \div \text{old EBIT} \times 100}$$

### Significance of Financial Leverage

The leverage that is created due to presence of debt component in the capital structure is called as financial leverage. Following are the advantages of such leverage:

- 1) Financial leverage helps in increasing earning per share.
- 2) Tax relief

Interest payment on debt financing is tax deductible And this helps to increase the profits available for equity holders.

### 3) Higher Profit for Shareholders

As presence of debt financing required the payment of only fixed obligation i.e. interest or charges so the shareholders will have higher profits in a successful business and when income of business is increasing.

- 4) It helps in capital structure planning.
- 5) It helps in increasing the value of firm
- 6) It provides a diversity of financing sources by which the firm can achieve its target earnings.

### Risk of bankruptcy

The company which has volatile income from its business may find it difficult to pay fixed payment obligation and so there is higher risk of bankruptcy.

### Illustration 4:

A Ltd. has the following capital structure:

Equity Share Capital (of Rs. 100 each)		Rs. 1,20,000
10% Preference Share Capital (of Rs. 100 each)		Rs. 2,40,000
10% Debentures (of Rs. 100 each)		Rs. 2,00,000

If EBIT is (i) Rs. 1,20,000    (ii) Rs. 80,000    (iii) Rs. 1,00,000,

Calculate financial leverage under three situations. Assume 50% tax rate, also calculate EPS.

### Solution:

Particulars	Situation (i)	Situation (ii)	Situation (iii)
EBIT	120000	80000	100000
<b>Less : Interest on debentures</b>	20000	20000	20000
EBT	100000	60000	80000
<b>Less : Income Tax @ 50%</b>	50000	30000	40000
PAT	50000	30000	40000
<b>Less : Preference Dividend</b>	24000	24000	24000
Earnings for Equity shareholders	26000	6000	16000
No. of Shares	1200	1200	1200
EPS	21.67	5.00	13.33
Financial leverage=EBIT/EBT	1.20	1.33	1.25

## **12.5 RELATION OF LEVERAGE WITH BREAK-EVEN ANALYSIS**

Leverage:Operating,  
Financial and  
Combined

Break even analysis helps a company to find out the level of operating leverage that would be perfect to earn more profit. A company with a high degree of operating leverage i.e. have more fixed cost in the cost structure of company have higher break even point in comparison with a company having low operating leverage.

Operating Leverage is used to calculate break even point and accordingly set selling price to cover its cost and generate profit.

### **12.5.1 Changing Costs and the Operating Breakeven Point**

When will it break even? This is one of the biggest questions that comes in mind. Answer is : when you're starting a business and for this reason it's so crucial to conduct a break-even analysis, which helps company to determine fixed costs (like rent, interest) and variable costs (like raw materials) so you can set your prices efficiently and forecast when a business will become profitable.

**Break-Even Point (Units) = Fixed Costs ÷ (sales price per Unit – Variable Cost per Unit)**

Thus the relationship between fixed cost and Break even point can be easily understood by the above formula, greater the fixed cost greater is Break Even.

Example: The Fixed cost of firm is Rs200,000 , Variable Cost = Rs10 Per unit, SP= 20 Per unit

$$\text{BEP} = 200,000 / (20-10) = 20000 \text{ units}$$

If the fixed cost is increased to 25,00,00, VC = Rs10 Per unit SP= 20 Per unit

$$\text{BEP} = 2,50,000 / (20-10) = 25,000 \text{ units}$$

It can easily be understood by the above example that when the Fixed cost or Operating leverage is increased in a firm then the BEP units also increases.

### **Check Your Progress B**

- 1) What is degree of financial leverage ? How is it calculated.

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- 2) What are its advantages?

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## 12.6 COMBINED LEVERAGE

It is the product of financial and operating leverage. The firm gets the combined benefits of Operating and financial leverage.

Combined Leverage = Operating Leverage × Financial Leverage

$$= \frac{\text{Contribution}}{\text{EBT}}$$

### 12.6.1 Degree of Combined Leverage

A degree of combined leverage (DCL) is a leverage ratio that summarizes the combined impact of operational leverage (DOL) and financial leverage (DFL) on earnings per share (EPS) for a given shift in revenue. This combination can be used to decide the best degree of financial and operational leverage for any company. Degree of Combined leverage can be calculated as:

$$= \frac{\text{Percentage change in EPS}}{\text{Percentage change in Sales}} \quad \text{or}$$

= Degree of operating leverage x Degree of Financial leverage

### 12.6.2 Significance of combined leverage

- 1) It displays the joint effect of operating leverage and financial leverage
- 2) It specifies the consequence that changes in sales will have on EPS.
- 3) A blend of high operating leverage and a high financial leverage is very risky situation because the combined effect of the two leverages is a multiple of these two leverages. It helps to find out the effects of fixed operating cost and fixed financial charges on operating profit and earning per share respectively.
- 4) A blend of high operating leverage and a low financial leverage indicates that the management should be careful as the high risk involved in the former is balanced by the later.
- 5) A blend of low operating leverage and a high financial leverage gives a better situation for maximizing return and minimizing risk factor, because keeping the operating leverage at low rate full advantage of debt financing can be taken to maximize return. In this situation the firm reaches its BEP at a low level of sales with minimum business risk

#### Illustration 5:

The following information related to the company X Ltd. for the year ended 31<sup>st</sup> March 2020 is available to you:

Equity Share Capital of Rs. 10 Each	25 Lakhs	Leverage: Operating, Financial and Combined
11% Bonds of Rs. 1000 Each	18.5 Lakhs	
Sales	42 Lakhs	
Fixed Cost (Excluding Interest)	3.48 lakhs	
Financial Leverage	1.39	
Profit Volume Ratio	25.55%	
Income Tax Rate	35%	

You are required to calculate:

- i) Operating leverage
- ii) Combined Leverage; and
- iii) Earning Per Share

#### **Solution:**

P/V Ratio = Contribution/Sales

25.55% = Contribution/42,00,000

**Contribution = 10,73,100**

$$\text{i) Operating Leverage} = \frac{\text{Contribution}}{\text{EBIT}} = \frac{\text{Contribution}}{\text{Contribution} - \text{Fixed Cost}}$$

$$= \frac{10,73,100}{10,73,100 - 3,48,000} = \frac{10,73,100}{7,25,100}$$

**Operating Leverage = 1.48**

$$\text{ii) Combined Leverage} = \text{Operating leverage} \times \text{Financial leverage}$$

$$= 1.48 \times 1.39 = 2.06$$

$$\text{iii) Earning Per Share} = \frac{\text{Earnings available to equity shareholders}}{\text{No.of equity shares}}$$

Earning available to Equity Shareholders = (EBIT – Interest) ×(1 – Tax rate)

$$= (7,25,100 - 2,03,500) * 0.65$$

$$= 3,39,040$$

$$\text{EPS} = \frac{3,39,040}{2,50,000} = 1.36$$

#### **Illustration 6:**

The following information is available for ABC & Co.

EBIT	RS. 10,50,000
Profit Before Tax	Rs. 2,70,000
Fixed Costs	Rs. 6,00,000

Calculate % change in EPS if the sales are expected to increase by 5%.

**Solution:**

To find out the % change in EPS as a result of % change in sales, the combined leverage should be calculated as follows:

**Operating Leverage** = Contribution/EBIT

$$\text{Contribution} = \text{EBIT} + \text{Fixed Cost}$$

$$= \frac{10,50,000 + 6,00,000}{10,50,000}$$

$$= 1.571$$

**Financial Leverage** = EBIT/Profit before Tax

$$= \frac{10,50,000}{2,70,000}$$

$$= 3.88$$

**Combined Leverage** = Contribution/ Profit before Tax = OL x FL

$$= 1.571 \times 3.88 = 6.11$$

The combined leverage of 6.11 means that for 1% change in sales level, the % change in EPS would be 6.11%. Hence, if the sales are expected to increase by 5%, then the **% increase in EPS** would be  $5 \times 6.11 = 30.55\%$ .

**Check Your Progress C**

Which of the following statement is True or False.

- 1) Operating leverage is the firm's ability to use variable cost to magnify the effect of changes in sales or EBIT.
- 2) Financial leverage is the relationship between EBIT and EPS.
- 3) Financial leverage analyses the advantages of using debt as a source of financing.
- 4) A high operating and financial leverage show low risk in the company.
- 5) When operating leverage is multiplied with financial leverage, it gives combined leverage.

**Illustration 7:**

From the information furnished below, Compute operating, financial and combined leverage in the two situations given and for the financial plans for A and B respectively in the both situations.

The plant capacity is 50,000 units. Annual Production and sales at 60% of capacity, selling price per unit is Rs. 250, variable cost per unit Rs. 150. Fixed cost in first situation is 1,00,000 and in the second situation is 1,20,000. Total capital is of 7,50,000. For plan A equity is  $1/3^{\text{rd}}$  of the total capital and rest is 10% debt and for plan B equity is  $2/3^{\text{rd}}$  of total capital and rest is 10% debt. S1, S2 are the symbols for situations.

**Solution:**

Leverage: Operating,  
Financial and  
Combined

<b>Particulars</b>	<b>PLAN A</b>	<b>PLAN B</b>	<b>PLAN A</b>	<b>PLAN B</b>
	<b>S1</b>	<b>S1</b>	<b>S2</b>	<b>S2</b>
Sales (installed capacity × % of production) × selling price per unit				
(50000×60%)×250	75,00,000	75,00,000	75,00,000	75,00,000
<b>Less: Variable Cost (units sold×Variable cost per unit)</b>	45,00,000	45,00,000	45,00,000	45,00,000
(30000×150)				
<b>Contribution</b>	30,00,000	30,00,000	30,00,000	30,00,000
Less: Fixed cost	1,00,000	1,00,000	1,20,000	1,20,000
<b>EBIT</b>	29,00,000	29,00,000	28,80,000	28,80,000
<b>Less: Interest on debt : Plan A is 10%(1/3 of 750000) Plan B is 10%(2/3 of 750000)</b>	50,000	25,000	50,000	25,000
<b>EBT</b>	28,50,000	28,75,000	28,30,000	28,55,000
Tax	Nil	nil	nil	Nil
<b>EAT</b>	28,50,000	28,75,000	28,30,000	28,55,000
Computation of Leverages				
<b>Operating Leverage: Contribution/EBIT</b>				
PLAN A S1= 3000000/2900000	1.03	1.03	1.04	1.04
PLAN B S1= 3000000/2900000				
PLAN A S2= 3000000/2880000				
PLAB B S2 = 3000000/2880000				
<b>Financial Leverage: EBIT/EBT</b>	1.017	1.008	1.017	1.008
PLAN A S1= 2900000/2850000				
PLAN B S1= 2900000/2875000				
PLAN A S2= 2880000/2830000				
PLAB B S2 = 2880000/2855000				
<b>Combined Leverage</b>				
<b>Operating leverage×Financial Leverage</b>	1.04751	1.03824	1.05768	1.04832

**Illustration 8:**

Calculate operating leverage, financial leverage, and combined leverage and comment on the risk position of the two firms, Amco and Wamco Ltd., given the following information.

Sales of Amco is 50,000 units and that of Wamco is 1,00,000 units, Variable cost is 20 per unit for Amco and 40 per unit for Wamco. Fixed cost of rent is Rs. 8,00,000 for Amco and Rs. 10,00,000 for Wamco. Interest on loan taken by Amco of Rs.5,00,000 @ 10% and Wamco of Rs. 7,00,000 @ 10%. Tax is 10% on the earnings. Sale price is Rs. 100 per unit

**Solution:**

<b>Particulars</b>	<b>Amco (Rs.)</b>	<b>Wameco (Rs.)</b>
Sales	50,00,000	1,00,00,000
<b>Less:</b> variable cost	10,00,000	40,00,000
<b>Contribution</b>	40,00,000	60,00,000
<b>Less:</b> Fixed Cost	8,00,000	10,00,000
EBIT	32,00,000	50,00,000
<b>Less :</b> Interest on Loan	50,000	70,000
EBT	31,50,000	49,30,000
Less Tax	3,15,000	4,93,000
EAT	28,35,000	44,37,000
Operating Leverage : Contribution /EBIT	1.25	1.2
Financial Leverage: EBIT/EAT	1.128	1.127
Combined leverage : Operating×Financial	1.410	1.352

**Comments on the risk position:**

In terms of business risk, the firm Amco is riskier with a higher operating leverage, In terms of financial risk, Amco is slightly on the higher side. But overall Amco is a riskier Proposition.

**Illustration 9:**

For T. Ltd., manufacturers of shoe soles, you are required to compute operating leverage from their data : sales as Rs. 50000, Variable cost being 60 % of sales, fixed cost as Rs. 12,000.

**Solution:**

Operating Leverage: Contribution / EBIT

Contribution: Sales – Variable Cost = Rs. 50,000-Rs. 30,000= Rs. 20,000

EBIT: Contribution – Fixed Cost= Rs. 20,000-12,000= Rs. 8,000

Operating Leverage: Rs. 20,000/Rs. 8,000=2.5

**Illustration 10:**

Compute combined leverage from the particulars of R. Ltd. Sales Rs. 25,00,000, Variable cost Rs. 15,00,000, Fixed cost at Rs. 5,00,000 and a loan of Rs. 12,00,000 @ 10% rate of interest.

**Solution:**

Contribution : Sales – Variable Cost= Rs. 25,00,000-Rs.15,00,000=Rs. 10,00,000

EBIT: Contribution- Fixed Cost= Rs.10,00,000-Rs.5,00,000= Rs.5,00,000

EAT: EBIT - Interest = Rs. 5,00,000 - Rs. 1,20,000 = Rs. 3,80,000

Operating Leverage: Contribution/EBIT = Rs. 10,00,000 / Rs. 5,00,000 = 2

Financial Leverage: EBIT/EAT = Rs. 5,00,000 / Rs. 3,80,000 = 1.315

Combined Leverage: Operating Leverage × Financial Leverage =  $2 \times 1.315 = 2.6$

**Illustration 11 :** A firm has sales of Rs 10 lakhs, and the variable cost of Rs 5 lakh, fixed cost of Rs 1 lakh and debt of Rs 2.5 lakh at 10%. Calculate the operating leverage financial leverage and combined leverage.

**Solution:**

calculation of EBIT

Particular	Amount (Rs.)
Sales	1000000
less: variable cost	500000
contribution	500000
less: fixed cost	100000
EBIT	400000
less: interest	25000
EBT	375000

Operating leverage      contribution/EBIT  
                              5,00,000 / 4,00,000  
                              1.25

Financial leverage      EBIT/EBT  
                              4,00,000 / 3,75,000  
                              1.066666667

Combined leverage      operating leverage × financial leverage  
                              1.33333375

**Illustration 12:**

Compute Degree of Operating, Financial and combined Leverage from following information.

sales is 200000 units at Rs 2 per unit.

variable cost is Rs 0.70 per unit.

fixed cost Rs. 2,00,000.

interest charges Rs 4,000.

Leverage: Operating,  
Financial and  
Combined

		(Rupees)
sales	$200000 \times 2$	4,00,000
<b>Less: variable cost</b>	$200000 \times 0.70$	1,40,000
contribution		2,60,000
<b>Less: fixed cost</b>		2,00,000
EBIT		60,000
<b>Less: interest</b>		4,000
EBT		56,000
operating leverage		Contribution/EBIT      4.333333 (2,60,000/60,000)
Financial leverage		EBIT/EBT      1.071429 (60,000/56,000)
Combined leverage		operating leverage × financial leverage $(4.333 \times 1.071) =$ 4.64

## 12.7 LET US SUM UP

In financial analysis, leverage represents the influence of one financial variable over some other related financial variable. The amount of leverage in the firm's capital structure can significantly affect its value by affecting returns and risks.

Operating leverage is concerned with the relationship between the firm's sales revenue and its earnings before interest and taxes. Degree of Operating leverage = Percentage change in EBIT/ Percentage change in sales, Break-even analysis, sometimes called cost volume profit analysis, is used by the firm to determine the level of operations necessary to cost all operating costs. High operating leverage is profitable when revenues are rising and bad when they are falling. Financial leverage is calculated EBIT/EBT as. Degree of Financial leverage = Percentage change in EPS/Percentage change in EBIT. Financial leverage affects financial risk of the firm. Combined leverage is the product of financial leverage and operating leverage.

## 12.8 KEY WORDS

- 1) **Debt:** It is outsider's capital.
- 2) **Degree of Operating Leverage:** It is the change in the percentage of operating income (EBIT) for the change in percentage of sales revenue.
- 3) **Financial Leverage:** It is the payment of fixed rate of interest for the use for the fixed interest bearing securities, to magnify the rate of return on equity shares.
- 4) **Leverage:** Amount of debt a firm was along with owner's equity to finance its assets.
- 5) **Operating Leverage:** It results from the present fixed operating expenses within firm's income stream.

- 6) **Operating Risk:** It is the risk of the firm not being able to cover its fixed operating costs.
- 7) **Operating Income:** It is a measure of a firm's profitability that excludes interest and income tax expenses.

Leverage:Operating,  
Financial and  
Combined

## **12.9 SELF- ASSESSMENT QUESTIONS/EXERCISES**

- 1) State the applications of financial leverage.
- 2) When does financial leverage become favourable? Discuss its impact on risk.
- 3) What do you understand by operating breakeven point and how fixed cost , variable cost per unit and sales price relate to it ?
- 4) What causes operating leverage and how much of it is risky for the firm to continue with its operations?

**Solve the following problems:**

- 1) A company has three alternative plans:

	A	B	C
Equity share capital	Rs. 30,000	Rs. 15,000	Rs. 45,000
Debentures @12%	Rs. 36,000	Rs. 45,000	Rs. 18,000

EBIT is Rs. 9,000

You are required to calculate financial leverage for each of the plans.

(A=1.92,B=2.50 and C =1.32)

- 2) Given below is the data of two companies:

Particulars	A LTD.	B LTD.
Sales	4,20,000	3,80,000
Variable cost	45% of Sales	40% of Sales
Fixed cost	25,000	30,000
Interest	1,15,000	90,000

You are required to calculate the degree of financial leverage for both companies.

( Financial Leverage for A ltd = 2.26, B Ltd =1.83)

- 3) A textile company has an EBIT of Rs. 3,20,000. The components of its capital structure are as follows:

10% Debentures	Rs. 10,00,000
12% Preference shares	Rs. 2,00,000
Equity shares of rs. 100 each	Rs. 8,00,000

The company is in the tax bracket of 35%.

- i) Determine its Earning Per Share (EPS).
- ii) Also, determine the degree of financial leverage.  
( $\text{EPS} = 14.875$  Financial leverage = 1.45)

- 4) The following details are furnished about a wholesale furniture firm. Calculate operating leverage, Sales is @ Rs 10000 per unit and sold 240 units Variable cost of labour and material for manufacturing each unit of the furniture is 50 % of the sales price per unit. Fixed cost of rent of space machinery electricity and other costs irrespective of sales is 8lacs. (3 times)
- 5) ABC ltd produces and sells 100000 shirts. The selling price is Rs. 500 unit. Variable cost is Rs 200 per unit and fixed operating cost is ` 25,00,0000. (a) Calculate operating leverage.(b) If sales are up by 10%, then what is the impact on EBIT.  
(a)- 3/5 (b) - 60%

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

## **BLOCK 4**

### **DIVIDEND DECISIONS**

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## BLOCK 4 DIVIDEND DECISIONS

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Dividend is part distribution of profit among the owners of business (equity owners). Corporate dividends have long history and are intertwined with the development of corporate form of business. In this block we are going to discuss the various aspects related to dividends and how over the years the dividend policy has evolved in its present form.

**Unit 13:** Dividend an Overview deals with the various provisions in the companies act related to declaration, payment and regulation of dividends. The next section of the unit deals with the valuation of the firm based on dividend stream of the firm. The dividends grow with time and impact the valuation of the firm. The quantum of increase in valuation with increase in dividends is also discussed in this section. Dividend capitalisation approach is often used for valuation purpose but analyst also use earning capitalisation approach to calculate the fair value of the share, this approach is also discussed in this unit. The last part of the unit discusses valuation of growth opportunities which arise due to earning retention and the linkages between share prices earnings and dividends.

**Unit 14 and Unit 15** deal with the dividend theories. The major objective of finance manager is to maximise the value of the firm as measured by its share price. The dividend policy and the retention policy are often competitive and conflicting in nature, the finance manager has to strike a fine balance between them. There are two major schools of thoughts regarding relevance of dividends in determining the value of the firm. The first one is Dividend relevance which argues that dividend decisions have relevance for value creation for the firm. This school of thought is discussed in unit 14 in detail, wherein we have discussed the Graham and Dodd Model, Walters's model and Gordon's model. **In unit 15** we discuss about the dividend irrelevance school which argues that timing and quantum of distribution of dividend has no impact on the value of the firm, but it is the cash flows generated by the firm which has impact on the value of the firm. In addition we also discuss about other theories which addresses some specific dimensions of dividend like tax effect, clientele effect, signalling effect and agency cost.

**Unit 16** Dividend Policy Decisions deals with the factors which should be kept in consideration while designing the dividend policy. Here we also discuss about the constraints in the operations of the dividend policy. Stability of dividends is an important dimension of dividend policy as erratic dividend policy may produce confusing signals for the investors. Corporate dividend behaviour was first analysed by Linter and the findings of his analysis are still relevant today. These findings are used to design the dividend policy are also discussed in this unit. Firms may follow different ways of returning cash to the shareholders either in the form of cash dividends, share buyback or bonus issue. The impact of these actions on the financial parameters of the firm is also analysed in this unit.

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# **UNIT 13 DIVIDENDS: AN OVERVIEW**

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## **Structure**

- 13.0 Objectives
- 13.1 Introduction
- 13.2 Provisions Relating to Dividends under Companies Act
  - 13.2.1 Types of Dividends
  - 13.2.2 Ascertainment of amount payable as dividend
  - 13.2.3 Conditions under which dividends cannot be declared
  - 13.2.4 Dividends declared from Reserves
- 13.3 Dividends and Valuation of firm
- 13.4 Growth in Dividends and Valuation
- 13.5 Valuation with variable growth in Dividends
- 13.6 Earnings and Capitalization
- 13.7 Linkage between Share Prices, Earnings and Dividends
- 13.8 Valuation of Growth Opportunities
- 13.9 Let Us Sum Up
- 13.10 Key Words
- 13.11 Answers to Check Your Progress
- 13.12 Self-Assessment Questions/Exercises

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## **13.0 OBJECTIVES**

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After studying of this unit, you should be able to:

- discuss the importance of dividend decisions;
- understand and apply the provisions of the companies act regulating declaration and distribution of dividends;
- explain the concept of valuation based on dividend;
- compute the value of firm on the basis of dividends;
- discuss the one stage and two stage models of valuation;
- identify and value growth opportunities; and
- understand the linkage between share price, earnings and dividends.

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## **13.1 INTRODUCTION**

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Dividends are distribution of part profit among the owners of business (equity owners). Corporate dividends have long history and are intertwined with the development of corporate form of business. Corporate dividends in

its rudimentary form can be traced back to early sixteenth century in Holland and Great Britain, where the captains of sailing ships financed their voyages by selling financial claims or “venture” in parts to common investors. The most common denomination of parts was 1/32, of the ships property, but interests of 1/8, 1/16, 1/48, 1/56 were also common.

On completion of each voyage the profits and capital were distributed among investors thus liquidating and ending the ventures life. As the number of voyages increased these financial claims began to be traded in open markets in Amsterdam and by the end of the sixteenth century were replaced by shares of ownership.

The enterprise liquidation at the end of each voyage ensured distribution of profit to owners and simultaneously reduced the probability and scope of fraudulent practices by captains. As the frequency of voyages increased and the profitability of these ventures were established the process of liquidation at the end of each voyage became increasing inconvenient and costly. At the same time the successes of the ventures resulted in the payment of generous dividends which resulted in increased credibility and simultaneously confidence of investors. As a result these federations of merchants turned themselves into companies and began trading as “going concern entities” and distributed profits only rather than the entire invested capital, which was more economically efficient.

So one can say that the dividend payments to shareholders began as convenience. The joint stock companies evolved from these merchant associations. These merchant associations when transformed to joint stock companies required capital for foreign trade, which was provided by investors (shareholders). This capital was put to profitable use by the captains of the sailing ships and dividends were paid to the shareholders out of the profits. The first joint stock company in Great Britain was Eastland Trading Company which was chartered and given monopoly trading rights to the Baltic countries. Similarly Muscovy and Levant companies were chartered with for trading with Russia and with Turkey respectively. With rapid industrialization in Europe and United States the number of joint stock companies grew rapidly and dividends became one of the sources of income for investors big and small.

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## **13.2 PROVISIONS RELATING TO DIVIDENDS UNDER COMPANIES ACT**

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According to the generally accepted definition term “dividend” means the profit of a company which is not retained in the business and is distributed among the shareholders in proportion to the amount paid-up on the shares held by them. Section 51 of the Companies Act, 2013 permits companies to pay dividends proportionately on pro-rata basis when all shares are not uniformly paid up. The term dividend has been defined under section 2 (35) of companies Act 2013 and includes interim dividend. Companies granted license under Section 8 of the act are prohibited from paying any dividend to its members and can apply profits only in promoting the objects of the

company. In case of liquidation the distribution of any amount of profit or property by liquidator is not considered as dividend.

In India, the declaration and payment of dividends is primarily governed by the companies Act, 2013 and in addition the provisions of the Securities Contracts (Regulations) Act, 1956 and the SEBI (Listing Obligations and Disclosure Requirements) Regulation, 2015 are also applicable to listed companies. Specific provisions relating to dividends in the income Tax Act, 1961 or under any other statute shall also be applicable for the purpose of dividends.

### **13.2.1 Types of Dividends**

Dividends can be classified according to:

- 1) The sources from which they are paid
  - a) Retained earnings
  - b) Profits of the current year
- 2) Medium in which they are paid
  - a) Cash dividends
  - b) Share Dividend(bonus shares)
- 3) Regularity with which they are declared
  - a) interim dividends
  - b) annual dividend or final dividend

#### **1) The sources from which they are paid:**

With regard to the first group of classification company can declare dividends out of profits of the current year or from the free reserves created by the profits of the previous years not distributed as dividends. As per the companies act 2013 “No dividend shall be declared or paid by a company for any financial year except out of profits of the company for that year after providing for depreciation in accordance with section 123(2) of the act or out of profits of the company for any financial years arrived at after providing of depreciation and remaining undistributed or out of both or out of money provided by Central or State government for payment of dividends in pursuance of guarantees given by the concerned government(sec.123).

The further details are given in the next section 13.2.2.

#### **2) Medium in which they are paid:**

With regard to the 2<sup>nd</sup> group of classification company can pay dividend in the form of cash through bank account of the shareholders. The dividend declared interim as well as final shall be transferred to a separate bank account within 5 days from the date of declaration date and has to be paid to the shareholders within 30 days from the date of declaration.

With regard to bonus shares the company declares bonus shares when it wishes to capitalize profits or reserves by issue of fully paid up bonus shares .Another way of giving bonus shares is to make partly paid up shares into fully paid up by bonus declaration. The effect of issuing bonus shares is that it increases number of fully paid up shares and simultaneously reduces the market value and book value in proportion in which bonus shares were declared. Issue of bonus shares will broaden the ownership structure of the firm. The firms are able to conserve cash by issue of bonus shares. The bonus shares can be issued only out of free reserves created out of genuine profits or share premium received in cash.

**3) Regularity with which they are declared:**

With regard to third group of classification interim dividends are those dividends which are declared and paid by the Board of directors between two annual general meetings, without declaring them at annual general meeting. Interim dividends are declared by the Board of directors at any time before the closure of the financial year. The Board of directors may declare interim dividend during financial year out of the surplus in profit and loss account and out of profit of the financial year in which such interim dividends is sought to be declared.

The final dividend is declared for a financial year after the final accounts are ready and the amount of distributable profit is available. The final dividend is declared by the company at its annual general meeting on the recommendation of the Board of directors.

Before we proceed further let us briefly discuss the frequently used terminology for dividends.

- 1) **Payout Ratio:** Payout ratio is defined as percentage of earnings distributed as dividends or dividends as percentage of earnings or dividends per share as a percentage of earnings per share.
- 2) **Dividend Yield:** dividend yield is defined as dividend per share divided by market price per share.
- 3) **Dividend Rate:** Dividend rate is defined as percentage of par value. Suppose a share is having a par value of Rs.10, declares a dividend at the rate of 20%.The dividend for this share would be Rs.2

### **13.2.2 Ascertainment of amount payable as dividend**

Dividends can be paid only out of the profits of the financial year from which such dividends are to be declared or out of profits of the previous financial year(s) which remains undistributed after adjusting for depreciation. Section 123(2) stipulates that depreciation be calculated as per provisions of schedule II. While calculating profits any amount representing unrealized gains, notional gains, gains on revaluation of assets and any change in carrying amount of asset or a liability on measurement of the asset or liability at fair value should be excluded from profit calculation.

Dividends may also be declared out of money provided by Central or State Government in pursuance of guarantee given by such governments for this purpose as per section 123(1) of the Act.

When the profits of the previous years are disclosed under the head surplus in the financial statements and dividends are declared from these surpluses it will not tantamount to declaration of dividends out of reserves and, therefore, will not attract statutory requirements relating to declaration of dividends out of reserves.

The fourth proviso to subsection (1) of section 123 provides that dividend shall be declared only after the carried over previous year(s) losses and depreciation not provided in previous year or years are set off against profit of the company for the current year. In addition the first proviso to sub section (1) of section 123 stipulates that before the declaration of any dividends in any financial year the company shall transfer such percentage of its profit for that financial year as it may consider appropriate to the reserves of the company based on the recommendations of the board of directors.

### **13.2.3 Conditions under which dividends cannot be declared**

A company is prohibited from declaring dividends on its equity shares in case of non compliance of the provisions of section 73 and 74 relating to the acceptance of deposits under the Companies Act, 2013 till such time the deposits accepted have been repaid along with the interest. In addition a company shall also not declare any dividend, in case it has defaulted in:

- i) Redemption of debentures or payment of interest thereon or creation of debenture redemption reserves.
- ii) Redemption of preference shares or creation of capital redemption reserves.
- iii) Payment of dividends declared in the current or previous financial year(s) or
- iv) Repayment of any term loan to a bank or financial institution or interest thereon.

The bar on declaration of dividends shall persist till such time the defaults mentioned above is subsisting. The above bar is also applicable on declaring dividends on preference shares.

### **13.2.4 Dividends declared from Reserves**

The Third proviso of sub section (1) of section 123 stipulates that no dividend shall be declared by a company from its reserves other than the free reserves. Free reserves as defined in section 2(43) means such reserves which as per the latest audited balance sheet of a company are available for distribution as dividend, Provided that:

- i) Any amount representing unrealized gains, notional gains or revaluation of assets, whether shown as a reserve or otherwise, or

- ii) Any change in carrying amount of an asset or of a liability recognized in equity, including surplus in profit and loss account on measurement of the assets or liability at fair value shall not be treated as free reserve when the dividends are declared out of free reserves.

The following conditions are to be complied with:

- i) The rate of dividend shall not exceed the average of the rates at which dividends were declared for the three preceding years. This provision would not be applicable to companies which had not declared any dividend in each of the preceding year.
- ii) The total dividend amount declared for distribution shall not exceed one tenth of the sum of the paid up share capital and accumulated profits.
- iii) Losses, if any, incurred in the financial year for which the dividends are proposed to be declared should be set off by the amount withdrawn from the reserves.
- iv) The balance of free reserves after withdrawal from free reserves shall not fall below 15% of the paid up share capital of the company.

Moreover it should be kept in mind that declaration of dividends out of profits of previous years which are shown under the head 'Surplus' shall not tantamount to declaration of dividends out of 'Reserves' and will therefore not attract the provisions prescribed from (i) to (iv). These provisions shall also not apply to companies in which the entire paid share capital is held by Central Government or State Government or jointly by both.

### **13.3 DIVIDENDS AND VALUATION OF FIRM**

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The valuation of equity shares is comparatively more complex as compared to bonds and preference shares as the variables used in equity valuation are not known with certainty and they are not stable over period of time viz. they may grow or decline over a period of time. The first variable which we use in equity valuation or for that matter any asset is the cash flow associated with that asset. In case of equity that cash flow is dividend. Now payment of dividend is discretionary viz. company can give dividends, vary the quantum of dividend or altogether abstain from giving dividends. Secondly the dividends are a function of firms earnings, which again are volatile in nature and may vary wildly over a period of time, thus the estimates of timing and quantum of equity cash flows is uncertain. To add to this complexity the earnings and dividends on equity are expected to grow over a period of time. This feature makes it difficult to calculate the share value. However this difficulty is circumvented by making certain assumptions. Now let us have a look at how equity is valued over different time horizons.

#### **Single period valuation:**

Let us assume that an investor wishes to purchase a share of ABC Company and intended to hold it for one year. It is expected that company will pay a dividend of Rs.4 next year and s/he can sell the share at an expected price of Rs.42 at the end of the year. The investors opportunity cost of capital or

required rate of return ( $K_e$ ) is 15%. At what price the investors should pay for the share today.

The valuation models in their simplest form calculate the present value of any assets by discounting all the expected further cash flows from the asset by appropriate discount rate depending upon the risk associated with the cash flows. Higher the risk perceived by the investors, higher the discount rates would be. With this logic the present value of the share today  $P_0$  will be the sum of the present values of the expected dividend per share ( $Div_1$ ) at the end of the first year and the present value of the expected price of the share ( $P_1$ ) at the end of the year.

### Mathematically

$$P_0 = \frac{Div_1}{1 + K_e} + \frac{P_1}{1 + K_e} \quad (13.1)$$

$$\text{or } P_{n-1} = \frac{Div_n}{1 + K_e} + \frac{P_n}{1 + K_e}$$

$$P_0 = \frac{4}{1.15} + \frac{42}{1.15} = 3.4782 + 36.5218 = 40$$

The present value of a share is a function of the expected dividends and expected price at the end of period  $n$  where  $n = 1, 2, \dots, \infty$  in present case  $n$  is 1.

Another way of determining the present value of share is by factoring in the expected price ( $P_1$ ) which is a function of expected growth in ( $P_0$ ) the present value of share. In the above example expected growth can be calculated as

$$g = \frac{P_1 - P_0}{P_0} \quad (13.2)$$

$$g = \frac{42 - 40}{40} = 0.05 \text{ or } 5 \text{ per cent}$$

The future share price  $P_1$  in term of expected growth  $g$  can be represented as

$$P_1 = P_0(1 + g) \quad 13.3$$

Taking data from above example  $P_1 = 40 (1 + .05) = \text{Rs. } 42$

Substituting the value of  $P_1$  in eq. 13.1

$$P_0 = \frac{Div_1 + P_0(1 + g)}{1 + K_e}$$

$$\Rightarrow P_0 + P_0 K_e = Div_1 + (P_0 + P_0 g)$$

$$\Rightarrow Div_1 = P_0 + P_0 K_e - (P_0 + P_0 g)$$

$$\Rightarrow Div_1 = P_0(K_e - g)$$

$$P_0 = \frac{Div_1}{K_e - g} \quad (13.4)$$

Taking data from above example  $P_0 = \frac{4}{.15 - .05} = \frac{4}{.10} = Rs. 40$

Equation 13.4 shows that present value of the share  $P_0$  is a function of expected dividend over the next year discounted by the difference of the shareholders required rate of return  $K_e$  and growth rate ( $g$ ) which is again a function of the expected price at the end of next year.

### Multi Period Valuation

Application of equations 13.1 and 13.4 helps us in determining the present value of a share in terms of the expected price at the end of year 1. Now if another investor is going to buy at the end of year one how is s/he going to estimate  $P_1$ . The price next year  $P_2$  will depends on expected dividend in 2<sup>nd</sup> year and the expected price of the share at the end of year 2.

In the preceding section, we had discussed how to value a security when it is held for a period of one year. In this section, we are going to explain the process for valuation of security if it is held for more than one year.

Today's price  $P_0$  or present value  $P_0$  can be determined by calculating the present value of dividends in year 1 and 2 and the present value of the expected liquidating price at the end of year 2 as follows:

$$P_0 = \frac{4}{1.15} + \frac{4.20 + 44.1}{(1.15)^2} = 3.4782 + 36.5218 = 40$$

Extending equation 13.1 to calculate  $P_1$  will result in the following equation

$$P_1 = \frac{Div_2 + P_2}{1 + K_e} \quad (13.5)$$

Since  $g = .05$

For e.g. if we consider  $Div_2 = 4.20$  and  $P_2 = 44.10$ , then  $P_1$  is

$$P_1 = \frac{4.20 + 44.1}{1.15} = 42$$

Substituting the value of  $P_1$  in equation 13.5 from equation 13.1

$$\begin{aligned} P_0(1 + K_e) - Div_1 &= \frac{Div_2 + P_2}{1 + K_e} \\ P_0 &= \frac{Div_2 + P_2}{(1 + K_e)^2} + \frac{Div_1}{(1 + K_e)} \end{aligned} \quad (13.6)$$

Now if we extend equation 13.6 to calculate the present value of a share paying dividend for  $n$  years the general formula for present value of share would be

$$P_0 = \frac{Div_1}{1 + K_e} + \frac{Div_2}{(1 + K_e)^2} + \dots + \frac{Div_n + P_n}{(1 + K_e)^n}$$

$$P_0 = \sum_{t=1}^n \frac{Div_t}{(1 + K_e)^t} + \frac{P_n}{(1 + K_e)^n} \quad (13.7)$$

In order to understand how equation 13.7 operates let us take an example of a share valued at Rs. 40 today and a year after  $Div_1$  would be Rs. 4. It is assumed that both share price and dividends are expected to grow at the rate of 5% annually. The opportunity cost of capital is 15%. Let us find out if the share is valued at fair price or not.

The expected dividends would be Rs. 4, 4.20, 4.41, 4.63, and 4.86 respectively for next 5 years. Similarly the expected price of the share at the end of fifth year would be:

$$40 \times (1.05)^5 = 40 \times 1.2762 = Rs. 51.05$$

$$P_0 = \left[ \frac{Div_1}{1 + K_e} + \frac{Div_2}{(1 + K_e)^2} + \dots + \frac{Div_n}{(1 + K_e)^n} \right] + \frac{P_n}{(1 + K_e)^n}$$

$$P_0 = \left[ \frac{4}{1.15} + \frac{4.20}{(1.15)^2} + \frac{4.41}{(1 + .15)^3} + \frac{4.63}{(1 + .15)^4} + \frac{4.86}{(1 + .15)^5} \right] + \frac{51.05}{(1.15)^5}$$

$$P_0 = [3.4785 + 3.1758 + 2.90 + 2.6472 + 2.4163] + 25.3805$$

$$P_0 = [14.6182] + 25.3818$$

$$P_0 = 40$$

The share is priced at fair value.

From equation 13.7 one can clearly deduce that the present value of the share consist of two components viz. the present value of future dividends and the present value of terminal or liquidating price of the share. As the time horizon increases the present value contributed by the dividend increases and the contribution of liquidating price trends towards zero. For a time horizon of 50 years or higher the contribution of the terminal value to the present value would be zero and the contribution of future dividends to the present value would be significant after 50 years.

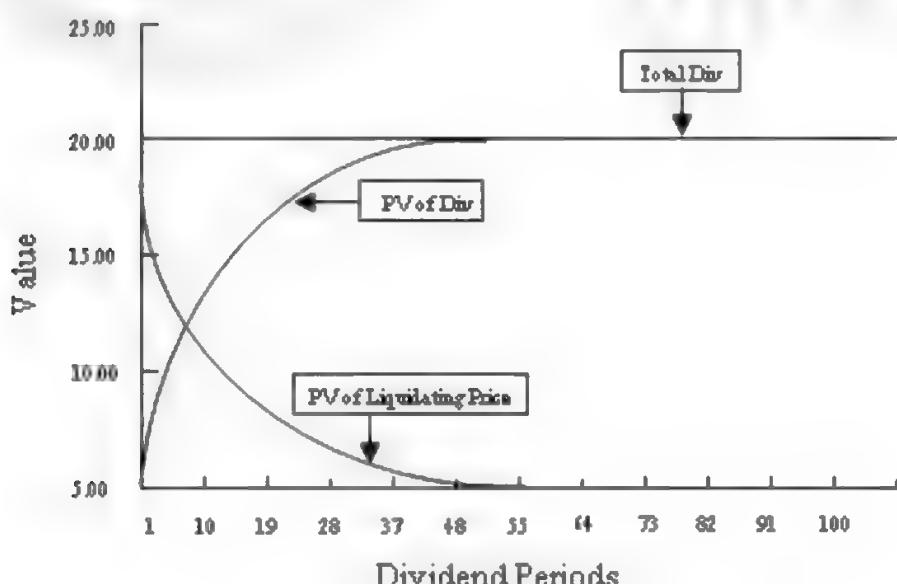


Fig. 13.1: Present value of future dividends and future share partials

In principle the time horizon  $n$  could be very large and can trend towards infinity. In this case the present value of the liquidating price would be approach to zero as shown in figure 13.1 and table 13.1 thus we can modify equation 13.7 to

$$P_0 = \frac{Div_1}{1 + K_e} + \frac{Div_2}{(1 + K_e)^2} + \dots \frac{Div_n + P_n}{(1 + K_e)^\infty}$$

$$P_0 = \sum_{t=1}^{n=\infty} \frac{Div_t}{(1 + K_e)^t} \quad (13.8)$$

You may notice that after 50 years the present value contribution of additional dividends is insignificant. The total present value of dividends plus terminal price remains the same at Rs.40 irrespective of the time horizon.

**Table 13.1: Present value of Future Dividends and Future Share Price**

Year (n)	Dividen d	PV of Dividend	Price of share	PV of Share price	Total PV	Sum of PV of Dividends
1	4	3.478261	42	36.52174	40	3.478261
2	4.2	3.175803	44.1	33.34594	40	6.654064
3	4.41	2.899647	46.305	30.44629	40	9.553711
4	4.6305	2.647503	48.62025	27.79879	40	12.20121
5	4.862025	2.417286	51.05126	25.3815	40	14.6185
6	5.105126	2.207087	53.60383	23.17441	40	16.82559
7	5.360383	2.015166	56.28402	21.15925	40	18.84075
8	5.628402	1.839934	59.09822	19.31931	40	20.68069
9	5.909822	1.67994	62.05313	17.63937	40	22.36063
10	6.205313	1.533858	65.15579	16.10551	40	23.89449
20	10.1078	0.617589	106.1319	6.484689	40	33.51531
30	16.46454	0.248665	172.8777	2.610981	40	37.38902
45	34.2286	0.063531	359.4003	0.667076	40	39.33292
50	43.68533	0.040313	458.696	0.423285	40	39.57671
75	147.934	0.004147	1553.307	0.043543	40	39.95646
100	500.9572	0.000427	5260.05	0.004479	40	39.99552

In this section we have discussed how to value shares based on the associated expected dividends.

#### Check Your Progress A

- 1) A company's expected dividend next year is Rs.7 per share. The dividend is expected to grow at 7 percent per annum forever. The equity

capitalization rate is 14 per cent. What would be the value of company's share?

- 2) You bought a share for Rs.100 a year ago. During the year you received a dividend of Rs.10. The share is presently quoted at price of Rs.125. What is your dividend yield and capital gain.

## **13.4 GROWTH IN DIVIDENDS AND VALUATION**

Until now we have discussed how share is valued using dividend discount model. In this model we had assumed that dividends grow at constant rate but in reality dividends could rise, fall or fluctuate randomly. In this section, we will discuss how the valuation of shares is impacted by rising dividends. For most of the companies earnings grow over a period of time and as a consequence dividends also grow. The growth in dividends is a function of the retention policy of the firm. Historical data suggests that most of the firms retain 40% to 50% of their earnings and reinvest them in profitable projects. Retention of earnings leads to increase in ordinary share-holders equity as well as the firm's future earnings. If the firm does not issue fresh equity the earnings per shares would also rise and will produce an expanding stream of dividends per share in future.

Now let us take a case of a firm which is showing normal growth. Normal growth is defined as the growth rate which is less than the capitalization rate or the opportunity cost of capital of the firm if the firm is growing at the rate of 7% and opportunity cost of capital of the firm is 12% then the firm is showing a normal growth. In case of firm with normal growth the rate of growth in dividends ( $g$ ) is  $g=b\times ROE$  where  $b$  is the retention ratio and  $ROE$  is return of equity.

$$g=b\times ROE \quad (13.9)$$

Now, with the help of a numerical example let us analyze how dividend and EPS grow over a period of time for normal growth firms.

**Example 13.1:** Assume that the book value of a firm's equity per share is Rs.200 and its return on equity is 15% and firm's retention ratio is 60%. Further assume that firm is all equity financed and retained earnings also earns at a rate of 15 per cent.

The firm earnings per share ( $EPS_1$ ) after one year would be  $Rs.200\times 0.15=Rs.30$

Since the retention ratio is 60% firm will retain  $Rs. 30\times .60=Rs.18$  and distributes Rs.12 as dividend. Now the book value of equity per share at the beginning of second year would be

$$BV_1 = Rs.200+Rs.18=Rs.218$$

The firm's EPS in year 2 would be

$$EPS_2 = Rs.218\times .15 = Rs.32.7$$

Since the retention ratio is 60%, firm will pay dividend of  $\text{Rs.}32.7 \times .40 = \text{Rs.}13.08 = \text{Div}_2$

Now growth in dividend is  $\frac{\text{Div}_2 - \text{Div}_1}{\text{Div}_1}$

$$\frac{13.08 - 12}{12} = \frac{1.08}{12} = 9\%$$

Similarly the growth in EPS is

$$\frac{\text{EPS}_2 - \text{EPS}_1}{\text{EPS}_1} = \frac{32.7 - 30}{30} = 9\%$$

Here you can observe that both EPS and Dividend have grown at the rate of 9%. The increase in EPS by Rs.2.7 from Rs. 30 to Rs.32.7 is on account of reinvestment of retained earnings of Rs. 18 at the rate of 15%. Recall that EPS in year 1 was Rs.30 out of which Rs.18 was reinvested at 15%. Since, there is increase in earnings and the retention ratio is held constant at 60% this would lead to increase in dividends. Increase in dividend would be the product of increase in EPS and (1-b) viz.  $(32.7 - 30) \times (1-.6) = 1.08$ .

The table 13.2 shows the growth in book value, earning per share, dividends and retained earnings over a period of time.

**Table 13.2: BV, EPS, DPS and Retained Earnings Under Constant Growth Assumptions**

Year N	Book Value in beginning of $BV_1$	Earnings per Share (EPS)	Dividend per share (DPS)	Retained Earnings (RE)	Book Value at the end
1	200.00	30	12	18	218
2	218.00	32.7	13.08	19.62	237.62
3	237.62	35.643	14.25	21.38	259.00
4	259.00	38.85	15.54	23.31	282.31
5	282.31	42.34	16.93	25.40	307.72
6	307.72	46.15	18.46	27.69	335.42
7	335.42	50.31	20.12	30.18	365.60
8	365.60	54.84	21.93	32.90	398.51
9	398.51	59.77	23.91	35.86	434.37
10	434.37	65.15	26.06	39.09	473.47
15	668.34	100.25	40.10	60.15	728.49
20	1028.33	154.25	61.69	92.54	1120.88
25	1582.17	237.33	94.93	142.40	1724.61
30	2434.43	365.16	146.06	219.09	2653.36

From the table we can easily infer that the firm will grow at a higher rate if it retains higher proportion of earnings, but if this strategy is followed the

current and future dividends will be low. When we discuss about valuation of firms based on dividend we shall explicitly factor in growth expectations because with growth the Quantum of dividend is also likely to grow. Now let us derive a valuation model for firms exhibiting normal growth. This model is for firms exhibiting normal growth. This model is based on the following assumption.

- 1) The opportunity cost of capital is greater than the growth rate  $K_e > g$
- 2) The initial dividend that is  $Div_1$  shall be greater than zero.
- 3) The relationship between  $K_e$  and  $g$  initially established remains unchanged and is constant and perpetual.

Let us assume that dividends ( $D_0$ ) grow at constant rate till infinity. If the present firm pays  $Div_0$  at the end of year 0, then dividend at the end of first year would be  $Div_1$ . The relationship between  $Div_0$  and  $Div_1$  with constant growth rate would be

$$Div_1 = Div_0(1 + g)$$

Now,  $Div_2$  at the end of second year would be

$$Div_2 = Div_1(1 + g) = Div_0(1 + g)^2$$

Similar relationship can be derived from future years. When dividends grow at constant rate the relationship of share price and dividends using dividend discount model is

$$P_0 = \frac{Div_0(1 + g)}{(1 + K_e)} + \frac{Div_0(1 + g)^2}{(1 + K_e)^2} + \dots \frac{Div_0(1 + g)^{n=\infty}}{(1 + K_e)^{n=\infty}}$$

$$P_0 = \sum_{t=1}^{n=\infty} \frac{Div_0(1 + g)^t}{(1 + K_e)^t}$$

On simplifying the above eq. we get

$$P_0 = \frac{Div_0(1 + g)}{K_e - g} = \frac{Div_1}{K_e - g} \quad (13.10)$$

In simple terms the present value of the share is equal to the dividend after year 1, ( $Div_1$ ) divided by the difference of the capitalization rate  $K_e$  and the growth rate. The above equation is also referred to as the **perpetual growth model**.

### Example: 13.2

A company paid a dividend of Rs.4 in the previous year. The future dividends are expected to perpetually grow at the rate of 8 per cent and the market rate of dividend capitalization is 10 per cent. Find out the share price today.

### Solution:

$$P_0 = \frac{Div_0(1 + g)}{K_e - g} = \frac{4(1 + 0.08)}{.10 - 0.08}$$

$$P_0 = \frac{4.32}{0.02} = Rs. 216$$

In order to understand how price of share is determine under perpetual growth. Let us look at another example:

**Example: 13.3:**

A company has book value per share of Rs. 150. Its return on equity is 16 per cent and it follows a policy of retaining 70 per cent of its earnings. If the opportunity cost or market dividend capitalization rate is 18 per cent, determines the price of the share today.

**Solution:**

This problem is to be solved in three steps. First calculate the earnings per share, after that calculate the dividends and the rate of growth in dividends and then put the value in the perpetual growth model.

The company's earnings and dividends per share after a year would be

$$EPS_1 = Rs. 150 \times 16\% = Rs. 24$$

$$Div_1 = (1 - .70) \times 24 = Rs. 7.2$$

The growth in dividends would be

$$g = b \times RoE = .7 \times .16 = .112 = 11.2\%$$

Since the dividend is growing perpetually, using the perpetual growth model

$$P_0 = \frac{Div_0(1 + g)}{K_e - g} = \frac{7.2}{.18 - .112} = \frac{7.2}{.068} = Rs. 105.88$$

**Check Your Progress B**

1. A company has a book value per share of Rs.200. Its return on equity is 18 percent and it follows a policy of retaining 60 per cent of its earnings. If the opportunity cost or market dividend capitalization rate is 20 percent , determine the price of the share today.

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## 13.5 VALUATION WITH VARIABLE GROWTH IN DIVIDENDS

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In real world situation the dividends of a firm may not grow at the same constant rate indefinitely. Firms may show high growth rate in few initial years and thereafter exhibit normal growth. Now in order to compute the present value of the share we have to take into account two growth rates; one is the super normal growth rate of the initial years and the normal growth thereafter. In this type of situation (two stage growth situation) the value of equity share is determined in two stages. In the first stage we calculate the present value of constantly growing dividend annuity for a definite super normal growth. In the second stage we calculate the present value of constantly growing dividends for perpetuity after the super normal growth

period. The formula for calculating the present value of equity share in the case of variable growth in dividends

$$P_0 = \sum_{t=1}^n \frac{Div_0(1+G_n)^t}{(1+K_e)^t} + \sum_{t=n+1}^{\infty} \frac{Div_n(1+g_n)^{t-n}}{(1+K_e)^t} \quad \dots 13.11$$

Where,  $P_0$  = price of equity share

$Div_1$  = dividend expected a year hence

$G_n$  = Super normal growth rate of dividends

$g_n$  = normal growth of dividends

In equation 13.11, the first term calculates the present value at  $t = 0$  of the dividends starting from the first year and growing at a super normal rate of  $G$  for a finite period  $t = n$ . The second term of equation 13.11 calculates the present value of the dividends at the end of the super normal growth period  $n$  and equals to the present value at  $t = n$  of a stream of dividends starting from  $t = n+1$  and growing at a constant normal rate perpetually. The second term of the equation 13.11 which represents perpetual growth can be written as follows:

$$P_n = \sum_{t=n+1}^{\infty} \frac{Div_n(1+g_n)^{t-n}}{(1+K_e)^{t-n}}$$

$$P_n = \frac{Div_n(1+g_n)}{K_e - g_n} = \frac{Div_{n+1}}{K_e - g_n}$$

Here you should note that the second term of equation 13.11 calculates the present value at time  $t = n$  and the first term calculates the present value at time  $t = 0$ . To calculate the present value we have to convert  $P_n$  to PV ( $P_0$ ).

**Step 1.** To calculate  $P_0$  the following three steps procedure can be used. Specify the dividend stream during the initial super normal growth period and find the present value of this dividend stream. The present value of the dividend stream of supernormal growth period is :

$$\begin{aligned} & \sum_{t=1}^n \frac{Div_t}{(1+K_e)^t} \\ &= \sum_{t=1}^n \frac{Div_0(1+G)^t}{(1+K_e)^t} \end{aligned}$$

**Step 2.** Calculate the present value of the equity share at the end of initial super normal growth period  $P_n = \frac{Div_{n+1}}{(K_e - g)}$  as per the constant growth model.

Discount this value to find the present value. The formula to calculate this is

$$\frac{Div_{n+1}}{(K_e - g)} X \frac{1}{(1+K_e)^n}$$

**Step 3** Add the values obtained in Step 1 and Step 2 to calculate  $P_0$ .

In order to understand this let us go through this example.

Company XYZ is paying a dividend to Rs.4 in the current year and is expecting to grow at supernormal growth rate of 25% for the next 4 years. Thereafter, the company expects to grow at normal rate of 8% per year and the equity investors required rate of return is 12%. Find out the present value of the share.

Now in order to solve this let us proceed step wise as explained above.

**Step 1.** Present value of the dividend stream during super normal growth of 25%

Steps 1.1 The dividend stream during super normal growth is

$$D_1 = \text{Rs. } 4(1.25), D_2 = 4(1.25)^2, D_3 = 4(1.25)^3, D_4 = 4(1.25)^4$$

$$D_1 = 5 \quad D_2 = 6.25 \quad D_3 = 7.8125 \quad D_4 = 9.7656$$

Step 1.2 Present value of the dividend stream

$$\begin{aligned} & \frac{5}{1.12} + \frac{6.25}{(1.12)^2} + \frac{7.8125}{(1.12)^3} + \frac{9.7656}{(1.12)^4} \\ &= 4.46 + 4.98 + 5.56 + 6.20 \\ &= \text{Rs. } 21.20 \end{aligned}$$

**Step.2** The price of the share at the end of 4<sup>th</sup> year after applying the constant growth model

$$\begin{aligned} P_4 &= \frac{D_5}{K_e - g} = \frac{D_4(1 + g)}{K_e - g} \\ &= \frac{9.7656 (1.08)}{.12 - .08} = \frac{10.5468}{.04} = 263.67 \end{aligned}$$

The discounted value of this at time of that is the price (present value)

$$\frac{263.67}{(1.12)^4} = \frac{263.67}{1.5735} = 167.56$$

**Step 3** The sum of the above 2 components is  $21.20 + 167.56 = \text{Rs. } 188.76$

## 13.6 EARNINGS AND CAPITALIZATION

The dividend capitalization approach is the basic share valuation technique; however it is not used as often as it should be due to the complexities involved in estimation of various variables. Analysts often use earnings capitalization approach to calculate the fair value of the share by capitalizing the expected earnings. The earnings capitalization approach consists of the following steps.

- 1) **Estimation of earnings:** Estimation of the earnings per share for the current and next financial year.
- 2) **Forecast of growth rate:** The expected growth rate in earnings is an important variable in equity valuation. For the companies operating with relatively stable cost and profit structure the growth in sales can be used as a proxy variable for estimating the growth in earnings.
- 3) **Assess the risk structure:** Risk is measured in varied ways depending upon the purpose for which these risk measures are to be used. For the equity valuation the following types of risk measures are commonly used.
  - **Business Risk:** Business risk is assessed by measuring the variability of operating income .Operating income is the income of the firm before payment of interest and taxes commonly referred as EBIT. The main sources of business risk are demand variability, price variability, variability in input cost (price of raw material, energy cost, wages etc.) and variability in operating leverage. Operating leverage is the proportion of fixed cost to variable cost. Any negative variance in any of these variables increases the business risk of the firm.
  - **Financial Risk:** Financial risk arises when the firm uses debt capital in its capital structure. An increase in interest rate results in more of operating income going towards payment of interest thereby reducing profits. Any default in payment of interest and principle amount would increase the cost of capital for the firm. In addition if the proportion of debt is higher in capital structure of the firm, the firm is inherently risky and would also incur higher cost of capital beyond a certain point of debt.
  - **Market Risk:** Market risk refers to variability of share price. The most common measure used to measure market risk is beta, which measures the sensitivity of the share price to change in market index.
- 4) **Establishing a Price Earning Multiple:** Price earning multiple commonly referred to as P/E ratio indicates how much an investor is willing to pay for every rupee of reported earnings. Companies having same reported earnings may have different P/E ratio as they may have different growth prospects and risk exposures, liquidity of the stock and a well communicating management of the firm. Other things being equal it is expected that:
  - Higher growth prospects in the future would lead to higher P/E ratio
  - Higher risk exposures in form of debt and riskiness of cash flows would lead to lower P/E ratio
  - Liquid stocks in general will have higher P/E ratio
  - Factual and timely communication by the management with the shareholders lead to higher P/E ratio
- 5) Developing a value anchor and value range:

The value anchor is calculated as follows:

Projected earnings per share  $\times$  Appropriate price earning multiple.

For example if the estimated future earnings per share is Rs.10 and appropriate price-earnings multiple is 10 the value anchor is going to be 100. Since valuation is an uncertain and subjective exercise, it is always prudent not to rely on single point intrinsic value estimate. A prudent approach would require developing an intrinsic value range around the single point estimate. For example in the above case one can determine a range of 90 to 110. Stocks having a higher beta would have a wider range.

**The earning capitalization approach has two main advantages:**

- Since the P/E ratio indicates how much an investor is willing to pay for every rupee of earnings or the price per rupee of earnings, the earnings capitalization approach is a convenient technique for comparing the prices of shares which have different levels of earnings per share
- The estimated variables required for applying the earning capitalization approach are fewer as compared to estimated variables required for dividend capitalization approach.

However in spite of its connivance the earning capitalization approach lacks sound conceptual basis and the estimates used in this approach lacks firm theoretical basis.

The concept of earning capitalization can be applied in two situations which are as follows:

- 1) When the firm distributes all its earnings as dividends that is the firm does not retain any earnings; earning retention ratio is zero.
- 2) When the firm's return on equity (ROE) is equal to firms cost of capital  $K_e$

In both these situations the price/value of the shares can be assessed using earnings capitalization rather than dividend capitalization.

Now let us analyze the first case where the firm distributes all its earnings as dividends. The earnings of the firm are stable and the firm does not employ any debt. Since, the retention rate is zero and no debt is employed, therefore, the growth rate  $g$  would be equal to zero and dividend would be equal to EPS (Earning per share). In this type of situation the value of the share would be equal to the expected earnings per share divided by the equity capitalization rate. Under these conditions  $Div_1 = EPS(1 - b)$  and  $g = rb$  (here  $r$  is equal to ROE), the share valuation formula would be

$$P_0 = \frac{EPS_1(1 - b)}{k_e - rb}$$

Since  $b = 0 \Rightarrow rb = 0$  therefore

$$P_0 = \frac{EPS_1}{k_e}$$

In case of firms retaining zero earnings, price of the equity can be assessed by capitalization of earnings rather than dividends.

In the second case where the firms return on equity (ROE) is equal to firms cost of capital implies that the firm lack growth opportunities and is not able to invest in projects generating return higher than the cost of capital. If we apply earning capitalization approach in this case it will yield the same result as that of dividend capitalization.

In this situation  $r = k_e$ ,  $g = rb \Rightarrow g = k_e b$  substituting these values in the eq.

$$P_0 = \frac{EPS_1(1 - b)}{k_e - rb}$$

Would result in

$$P_0 = \frac{EPS_1(1 - b)}{k_e - rb} = \frac{EPS_1(1 - b)}{k_e(1 - b)} = \frac{EPS_1}{k_e}$$

The true growth in firms is not characterized by mere expansion but is depends on existence of investment opportunities to reinvest retained earnings at the rate higher than the cost of capital or capitalization rate  $k_e$ . This allows creation of net present value over and above the investment outlay required.

#### **Example 13.4**

Calculate the price of a share if EPS=Rs.5, b (retention ratio) = 0.4 and  $k_e = .10$  and ROE = 0.20. What shall be the price?  $r = k_e = .10$

$$P_0 = \frac{EPS_1(1 - b)}{k_e - rb} = \frac{5.00 (1 - 0.4)}{.10 - (.20) \times .4} = \frac{3.00}{.10 - .08} = \frac{3.00}{.02} = Rs. 150$$

When  $r = .10$

$$P_0 = \frac{5.00 (1 - 0.4)}{.10 - .10 \times .4} = \frac{3.00}{.10 - .04} = \frac{3.00}{.06} = Rs. 50$$

#### **Check Your Progress C**

- 1) What is equity capitalization rate?

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.....  
.....

- 2) How is equity capitalization rate determined?

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- 3) A company's share is presently selling at Rs.60 per share. It is expected that a dividend of Rs.2 per share after one year will grow at 6 per cent indefinitely. What is the equity capitalization rate?

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## 13.7 LINKAGE BETWEEN SHARE PRICES, EARNINGS AND DIVIDENDS

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Investors have two main motives for investing in equity shares. One is to have regular income through dividends and the other is to have capital gains in the future. Both of these motives can not give high regular dividends and have capital gains simultaneously. The shares which provide high dividends regularly are termed as Income shares where as the shares which provides capital gains in the future are termed as Growth shares. Growth shares have a higher probability for capital gains. The Dividend yield (dividend per share as the percentage of the market price of share) is generally low on growth stocks as companies follow a policy of high retention in order to have high growth rate in future. In case of Income Shares Dividend Yields is high as the company follows a policy of low retention and higher payout. Investors would generally prefer profitable companies to follow high retention policy and normal companies to follow a high payout policy.

Now let us examine whether there is a linkage between share price, earnings and dividends. To explore this linkage consider an example.

**Example:**

The estimated earnings per share ( $EPS_1$ ) of a firm after a year is Rs.10. It follows a policy of zero retention of earnings i.e. all the income is distributed as dividends. What would be the price of the share if the opportunity cost of capital is 15 per cent?

$$P_0 = \frac{EPS_1(1 - b)}{k_e - g} = \frac{EPS_1(1 - b)}{k_e - rb} = \frac{10(1 - 0)}{.15 - 0} = \text{Rs. } 66.66$$

Now modifying the above example suppose that the firm would pay a dividend of Rs. 6 per share in the first year and reinvest the retained earnings at a rate of return ( $r = ROE$ ) of 25 per cent. What would be the first payout ratio, retention ratio and growth rate?

$$\text{Pay Out ratio} = \frac{Div_1}{EPS_1} = \frac{6}{10} = 60 \text{ per cent.}$$

$$\text{Retention ratio} = 1 - \text{payout ratio} = 1 - .6 = .4 \text{ or } 40 \text{ per cent}$$

$$\text{Growth rate} = \text{Retention Ratio} \times \text{ROE}$$

$$= b \times r = .4 \times .25 = .1 \text{ or } 10 \text{ per cent}$$

Now assuming that the firm follows a constant policy of retention of earnings at 40% and reinvesting them at a return equal to ROE which is 25%. This would result into perpetual growth in dividends and earnings at the rate of 10% since  $g = br$ ,  $g = .4 \times .25 = .100 = .10$

Now under this assumption let us find out the share price of the firm

$$P_0 = \frac{EPS_1(1 - b)}{k_e - rb} = \frac{10(1 - 0.4)}{.15 - .10} = \frac{6}{.05} = Rs. 120$$

Note that without retention of earnings the share price was Rs. 66.66 but when the firm decides to retain earnings and reinvest the same which result into growth of both earnings and dividends share price changes from Rs.66.66 to Rs.120 a change of Rs.53.34 and in percentage terms an increase of 80%. This Rs. 53.34 is the value of growth opportunities.

## **13.8 VALUATION OF GROWTH OPPORTUNITIES**

Retention of earnings generates cash flows and thus adds value. From the previous example the retained earnings in the first year would be  $RE_1 = .4 \times 10 = Rs. 4$  and it would be reinvested at 25% rate of return per year resulting into a perpetual stream of cash flows (CF) of Rs.1 per share from the second year

$$RE_1 = .4 \times 10 = Rs. 4$$

$$CF = RE_1 \times RoE = 4 \times .25 = Rs. 1$$

Now in the second year EPS would increase by Rs.1 and  $EPS_2$  should be  $Rs.10+1=Rs.11$ . The firm will retain Rs. 4.4 and reinvest this amount at ROE of 25% resulting into perpetual cash flow of Rs. 1.1 starting from third year

$$RE_2 = .4 \times 11 = Rs. 4.4$$

$$CF = RE_2 \times RoE = 4.4 \times .25 = Rs. 1.1$$

Similarly for the third year firm's EPS will be  $Rs. 10+1+1.1=Rs.12.1$ . Similar calculations can be made for future years. Here you may observe that EPS, dividends per share, retained earnings and cash flow from retained earnings are growing at a constant rate of 10%.

$$\begin{aligned} NPV_1 &= \frac{CF}{k_e} - RE_2 \\ &= \frac{1}{.15} - 4 = 6.66 - 4 = Rs. 2.66 \end{aligned}$$

The firm will be able to generate a perpetual cash flow of Rs. 1.1 starting from 3<sup>rd</sup> year from its reinvestment of Rs. 4.4 at the end of second year. Since, the growth rate is 10% the perpetual cash flows from additional investments will also grow at this rate. The second stream of cash flow would be  $4 \times (1 + .10) - 1.1$ . The NPV of this stream of cash flow at the end of the second year would be

$$\begin{aligned} NPV_2 &= \frac{CF}{k_e} - RE_2 \\ &= \frac{1.1}{.15} - 4.4 = 7.33 - 4.4 = Rs. 2.93 \end{aligned}$$

Here you can note that NPV is also increasing at the rate of 10% thus

$$NPV_2 = NPV_1(1 + .10) = 2.66 + 1.1 = 2.93$$

$$NPV_3 = NPV_2(1 + .10) = 2.97 + 1.1 = 3.21$$

NPV for future years can also be calculated in similar way. The total value of the firm's growth from the reinvestment of its retained earnings would be the sum of the discounted value of the stream of NPVs.

$$V_g = \frac{NPV_1}{(1 + K_e)} + \frac{NPV_2}{(1 + K_e)^2} + \frac{NPV_3}{(1 + K_e)^3} + \dots \frac{NPV_{n=\infty}}{(1 + K_e)^{n=\infty}}$$

$$\text{Note: } NPV_n = NPV (1 + g)^{n-1}$$

This equation is similar to the constant dividend growth model and can be restated as

$$V_g = \frac{NPV_1}{k_e - g} \quad 13.12$$

For the previous example  $V_g$  would be

$$V_g = \frac{2.66}{.15 - .10} = 53.2$$

From the above equation we can infer that value of share today  $P_0$ , consists of two components:

- 1) The present value of perpetual stream of earnings under no growth assumption that is 100% payout.
- 2) The present value of the stream of cash flows arising from reinvestment of retained earnings

$$P_0 = \frac{EPS_1}{k_e} + \frac{NPV_1}{k_e - g} \quad 13.13$$

Equation 13.12 can be restated in terms of retained earnings, EPS and ROE

$$V_g = \frac{NPV_1}{k_e - g} = \frac{b + EPS_1(ROE - k_e)}{k_e(k_e - g)}$$

### **Impact of growth on Price, Returns and P/E Ratio:**

Companies do not experience same rate of growth rate, it varies from negative to super normal. Assuming a constant total required return that is the sum of dividends and capital gains is same we illustrate the impact of growth rate on stock price, dividend yields, capital gains yield and Price earnings ratios

To establish this consider three cases

	Growth rate (%)
Low growth firm	5
Normal growth firms	10
Super normal growth firms	15

The expected earnings and dividends per share of each of these 3 firms are Rs. 9 and 6 respectively. Investor's total return required from equity investment is 20%. The firms cost of equity is 20%. Total return is the sum of dividends yield and capital gain yield.

The stock prices, dividend yield, capital gains yield and P/E ratio are as shown in table 13.3

Table 13.3: Price, Dividend Yield, Capital gains Yield and P/E ratio under different growth assumption for 20 per cent total return.

	<b>Price</b>	<b>Dividend Yield</b>	<b>Capital gains yield</b>	<b>P/E ratio</b>
	$D_1/P_0$	$(P_1 - P_0)/P_0$		
<b>Low growth firm</b>	$P_0 = \frac{D_1}{(K_e - g)}$ $= \frac{6}{.20 - 0.05}$ $= Rs. 40$	15%	5%	4.44
<b>Normal growth firms</b>	$= \frac{6}{.20 - 0.10}$ $= Rs. 60$	10%	10%	6.67
<b>Super normal growth firms</b>	$= \frac{6}{.20 - 0.15}$ $= Rs. 120$	5%	15%	13.13

From analysis of the results obtained in table we can infer the following:

- 1) With increase in dividends other things being equal the proportions of capital gain yield increases in total return.
- 2) The P/E ratio increases with the expected growth rate in dividends, other things being held equal
- 3) Low P/E ratio and high dividend yield implies limited investment opportunities thereby suggesting limited growth prospects.
- 4) Low dividend yield and high P/E ratio implied expanded investment opportunities thereby suggesting expanded growth prospects.

## 13.9 LET US SUM UP

Dividends are distribution of part profit among the owners of business (equity holders). Dividends in their present form have evolved with the development of corporate form of business. Companies law defines how the dividends are to be decided, declared and distributed. For valuation of any asset we discount the cash flows associated with that asset to find the present value of that asset. In case of shares (equity) the cash flows consist of

dividends and the terminal price of the share. Since the cash flows associated with equity are not known with certainty the equity capitalization rate used to find the present value of shares would be higher for shares paying irregular dividends. For Valuation of shares we discount the dividend streams and the terminal price of the share which tends to zero as the time horizon increases, therefore for valuation of shares the most important variable is dividend. When we assume that dividends are growing at constant rate the share value is equal to the capitalized value of the earnings plus value of growth opportunities. The firms having high retention ratio and cost of capital less than the capitalization rate will have high value of growth opportunities embedded in the share price.

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## 13.10 KEY WORDS

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**Dividend Capitalization:** Dividend capitalization approach is used for estimating a firm's cost of common (ordinary) equity. This **approach** approximates a future **dividend** stream based on the firm's **dividend** history and an assumed growth rate, and computes the market **capitalization** rate that equates it with the current market price.

**Earning Capitalization:** Earnings capitalization approximates the value of a business based on the future estimated benefits, using some measure of future earnings or cash flows . These estimated future benefits are then capitalized using an appropriate capitalization rate to calculate the present value of the business.

**P/E ratio:** P/E ratio is calculated as the price of the share divided by earnings per share

**Growth shares:** Shares which give low dividends but have a high potential for future capital gains

**Income shares:** Income shares are those shares which provide regular dividends

**Super normal growth:** **Supernormal growth** is a period of higher earnings, for one year or more. **Supernormal growth** periods are normally of short duration as it is unsustainable over the long-term as competition and market saturation will lead to lower **growth** levels.

**Value of growth opportunities:** The net present *value of growth opportunities* (NPVGO) is a calculation of the net present *value* per share of all future cash flows involved with **growth opportunities** such as new projects or **potential** acquisitions.

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## 13.11 ANSWERS TO CHECK YOUR PROGRESS

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A Use the formula to calculate the present value of share ( $P_0$ )

$$P_0 = \frac{Div_0(1 + g)}{K_e - g} = \frac{Div_1}{K_e - g}$$

$$P_0 = 7/.14 - .07 = 7/.07 = 100$$

2) Dividend yield = Dividend/Price at which share is bought =  
 $10/100 = 10\%$

Capital gain=Market value price at which share is bought  
 $= 125 - 100 = 25\%$

B  $EPS_1 = Rs. 200 \times 18\% = Rs. 36$

$$Div_1 = (1 - .60) \times 36 = Rs. 14.4$$

The growth in dividends would be

$$g = b \times RoE = .6 \times .18 = .108 = 10.8\%$$

Since the dividend is growing perpetually, using the perpetual growth model

$$P_0 = \frac{Div_0(1 + g)}{K_e - g} = \frac{14.4}{.20 - .108} = \frac{14.4}{.092} = Rs. 156$$

Note:  $Div_1 = Div_0(1+g)$

$$C3) P_0 = \frac{Div_1}{K_e - g} = K_e = \frac{Div_1}{P_0} + g$$

$$K_e = \frac{2}{60} + \frac{6}{100}$$

$$K_e = \frac{20 + 36}{600} = \frac{56}{600}$$

$$K_e = 9.33\%$$

## 13.12 SELF-ASSESSMENT QUESTIONS

- 1) How is ascertainment of amount payable as dividend done as per the Companies Act?
- 2) Discuss the conditions under which dividends can't be declared.
- 3) What are the conditions under which dividends can be declared from free reserves?
- 4) How is the valuation of firms done based on dividends?
- 5) How is the valuation of a firm impacted by the growth in dividends?
- 6) Explain the Earnings Capitalization Approach.
- 7) Explain the linkage between share price, earnings and dividends.
- 8) How is the valuation of growth opportunities done?

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 14 DIVIDEND THEORIES-I**

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### **Structure**

- 14.0 Objectives
  - 14.1 Introduction
  - 14.2 Graham and Dodd Model
  - 14.3 Walter's Model
  - 14.4 Gordon's Model
  - 14.5 Let Us Sum Up
  - 14.6 Key Words
  - 14.7 Self-Assessment Questions/Exercises
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### **14.0 OBJECTIVES**

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After studying of this unit, you should be able to:

- explain the traditional position establishing the relationship between dividend and share value;
  - critically evaluate and establish the relevance of dividends;
  - discuss the dividend capitalization approach for equity valuation;
  - understand and apply Walter's and Gordon's model for equity valuation; and
  - understand the bird in hand argument for paying dividends.
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### **14.1 INTRODUCTION**

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The dividend policy of a firm is basically designed to apportion the earnings of the firm between the shareholders and the firm itself. In order to maximize the value of the firm the firm's dividend policy must be designed keeping in view the three other value impacting variables which are the firm's investment policy, financing mix policy and the capital structure policy. Dividend policy determines the quantum of trade off between retained earnings and paying of cash to the shareholders. The dividend policy and retention policy are often competitive and conflicting. One of the objectives of the dividend distribution is to maximize the value of the firm as measured in terms of the market price of firm's equity share. The equity shares are liquid financial instrument and holders of these equity shares do require a return on this investment in form of dividends but at the same time the firms also require funds for expansion and growth of business. These conflicting requirement of firms and shareholders have given rise to two schools of thought wherein one school of thought is of opinion that dividend decision has relevance to value creation potential of the firm whereas the other school is of opinion that the timing and quantum of distribution of dividend does not

affect firm value and in absence of taxes and transaction cost cash dividend is equivalent to share repurchase. The first school of thought is known as Dividend Relevance and is propagated by Walter, Gordon and others. The second school of thought is known as Dividend Irrelevance and is propagated by Merton Miller and Franco Modigliani and is popularly known as Dividend Irrelevance Theory.

When managers have to take decision for declaration of dividend they have to address a fundamental question which is whether the firm would be able to earn more than shareholders if it decides to retain the earnings or shareholders would be able to earn more if they receive dividends and invest in alternative investments with the same risk. Another aspect which the managers have to look at is the quantum of earnings which needs to be retained.

In order to understand the theoretical basis of the dividend behavior, we are going to discuss the various dividend theories in this unit and the next unit. In this unit we are going to discuss the various dividend theories pertaining to dividend relevance school of thought.

## **14.2 GRAHAM AND DODD MODEL**

### **Graham and Dodd Model (The traditional position)**

According to this model the capital markets (investors) are considerably more favorable to companies paying dividends than on companies laying emphasis on retained earnings. This view is expressed quantitatively in the following valuation model advanced by Graham and Dodd.

$$P = m (D + E/3) \quad (14.1)$$

Where,

P = market price per share

D = dividend per share

E = earnings per share

m = multiplier

R = Retained earnings

$$E = D + R$$

Replacing E with D+R

$$P = m \left( D + \frac{D + R}{3} \right) = m \left[ \frac{4D + R}{3} \right] \quad (14.2)$$

According to this model the contribution of dividends to the price of the share is 4 times more as compared to the retained earnings.

The weight assigned in this model is not based on any empirical analysis but are based on the subjective assessment. However, the major thrust of the

argument is that liberal dividends or high payout policy has a positive impact on Stock prices.

In support of the above argument it is often cited that firms having high pay out often exhibit high price earnings (PE) ratio and firms having low pay out policy exhibit low price earning (PE) ratio. However this line of logic has serious flaws; consider a firm having high P/E ratio and high payout ratio, but current earnings are temporarily depressed, this may result into two likely scenarios:

- 1) The dividend payout ratio may remain high as companies are hesitant to reduce the dividends per share in case of temporary decline in earnings as investors regard dividend changes as signals of management's earning forecast.
- 2) The price earnings ratio may continue to remain high in case of temporary decline in earnings as market is forward looking and discount the future earnings not the present earnings.

From these two scenarios one may conclude that high dividend payout ratio leads to a high price earnings ratio but such inference is flawed.

Another factor to be kept in consideration while drawing inference from payout ratio is the riskiness of firm's cash flows. When high risk is associated with firm's operations such firms typically have low payout ratio as management tends to be conservative in order to make provisions for hard times. Secondly, the investors are generally risk averse and do not pay premium for risky operations. Now again we may infer that low payout ratio leads to low price earnings ratio, this inference is flawed as low payout ratio and low PE ratios are result of a risk associated with firms operations.

#### Check Your Progress A

- 1) Explain the essence of Graham and Dodd model.

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### 14.3 WALTER'S MODEL

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Professor James E. Walter proponent of this model argues that dividend policies pursued by firms have a bearing on its market price. This model establishes the relationship between the firm's rate of return ( $r$ ), its cost of capital ( $k$ ) in determining the firm's dividend policy which will maximize the market price of the firm's share. The Walter's assumption is based on the following restrictive assumptions.

- 1) **Internal financing:** All the investments of the firm are financed through retained earnings which imply that either, debt or new equity is not issued.

- 2) **Constant return and cost of capital:** The firm's rate of return ( $r$ ) and its cost of capital ( $k$ ) are constant throughout the life of the firm.
- 3) **100 percent payout or retention:** The earnings of the firm are either paid as dividends in full or are retained in full to be reinvested immediately.
- 4) **Retained earnings are only source of financing.**
- 5) **Constant Earning Per Share (EPS) and Dividend per share.** In this model it is assumed that the beginning earnings and dividends do not change, however the value of the EPS and Dividend may be changed to demonstrate the effect of dividend policy under varying profitability assumptions. Any given values of EPS and Dividend are assumed to remain constant throughout the life of the firm which is assumed to be very long and infinite.

Based on the above assumption Walter's Valuation formula is as follows:

$$P = \frac{D}{k} + \frac{(E - D) \frac{r}{k}}{k} \quad (14.3)$$

Where,

P= Market price per share

D = Dividend per share

E = Earnings per share

$r$  = Firm's rate of return or internal rate of return on firm's investment

$k$ = Firm's cost of capital or capitalization rate

An analysis of eq. 14.3 reveals that the market price per share is the sum of the

- i) Present value of an infinite stream of constant dividends, and
- ii) Present value of an infinite stream of returns from retained earnings.

Equations 14.3 is derived as follows: From the explanation given above it is clear that the market price of firm's share is composed of present value of the infinite stream of dividend  $D_1, D_2, D_3, D_n$ , while  $D_1, = D_2, = D_3, \dots, = D_n$ . The present value of an infinite stream of D is

$$\frac{D}{(1+k)} + \frac{D}{(1+k)^2} + \frac{D}{(1+k)^3} + \cdots \frac{D}{(1+k)^n} = \frac{D}{k} \quad (14.4)$$

and

The present value of an infinite stream of returns from retained earnings when the firm retains a perpetual sum of  $(E-D)$  and invests them at  $r$  rate of return its present value is calculated as follows:

Let us assume that every year retained earnings are  $(E-D)$  and are reinvested at rate of return  $r$ . The return from the first year's retained earnings would be

Dividend Decisions	Time	0	1	2	3	4	.....	(A)
		-	$(E - D)r$	$(E - D)r$	$(E - D)r$	$(E - D)r$		

**Note:** Retained earnings at time  $n=1$  starts earning returns from time =  $n+1=2$ . The retained earnings pertaining to time 1 would start earning return from time 2.

The present value of the return depicted at 'A' is

$$\frac{(E - D)r}{(1 + k)^2} + \frac{(E - D)r}{(1 + k)^3} + \dots = \frac{(E - D)r}{k(1 + k)}$$

Similarly the return from the second retained earnings would be

Time	0	1	2	3	4	5	.....	(B)
	-	-	-	$(E - D)r$	$(E - D)r$	$(E - D)r$		

The present value of the return depicted at 'B' is

$$\frac{(E - D)r}{(1 + k)^3} + \frac{(E - D)r}{(1 + k)^4} + \dots = \frac{(E - D)r}{k(1 + k)^2}$$

Similarly the present value of the returns from the retained earnings of the third year would be

$$\frac{(E - D)r}{k(1 + k)^3}$$

Sum of the present value of the stream of returns from the retained earnings is

$$\frac{(E - D)r}{k(1+k)} + \frac{(E - D)r}{k(1+k)^2} + \frac{(E - D)r}{k(1+k)^3} + \dots = \frac{(E - D) \frac{r}{k}}{1 - \frac{1}{1+k}} \quad \dots \dots \dots \quad 14.5$$

Adding Equation 14.4 and 14.5 we get equation 14.3

$$P = \frac{D}{k} + \frac{(E - D) \frac{r}{k}}{k} \quad (14.3)$$

After going through this derivation we can conclude that the value of the share of a firm is a function of the present value of expected future dividends which are constant in this model and the present value of an infinite stream of returns from retained earnings which again remains constant throughout the life of the firm.

Now in order to understand how the optimum dividend policy is dependent on firm's cost of capital and rate of return let us take an example in which we apply Walter's model to determine the value of firms share. The variables required to calculate the price are given in the top row of the table 14.1.

**Table 14.1: Dividend Policy and Value of Firm's Share (Walter's Model)**

Growth Firm $r > k$ $r = 0.20$ $k = 0.10$ $EPS = Rs. 10$	Normal Firm $r = k$ $r = 0.10$ $k = 0.10$ $EPS = Rs. 10$	Declining Firm $r < k$ $r = 0.05$ $k = 0.10$ $EPS = Rs. 10$
Payout ratio 0% $\Rightarrow D = 0$ $P = \frac{0 + (10 - 0) \times .2/.1}{0.1} = Rs. 200$	Payout ratio 0% $\Rightarrow D=0$ $P = \frac{0 + (10 - 0) \times .1/.1}{.1} = Rs. 100$	Payout ratio 0% $D=0$ $P = \frac{0 + (10 - 0) \times .05/.1}{0.1} = Rs. 50$
Payout ratio 40% $\Rightarrow D = 4$ $P = \frac{4 + (10 - 4) \times .2/.1}{0.1} = Rs. 160$	Payout ratio 40% $\Rightarrow D = 4$ $P = \frac{4 + (10 - 4) \times .10/.1}{.10} = Rs. 100$	Payout ratio 40% $\Rightarrow D = 4$ $P = \frac{4 + (10 - 4) \times .05/.1}{.10} = Rs. 70$
Payout ratio 80% $\Rightarrow D = 8$ $P = \frac{8 + (10 - 8) \times .2/.1}{0.1} = Rs. 120$	Payout ratio 80% $\Rightarrow D = 8$ $P = \frac{8 + (10 - 8) \times .10/.1}{0.10} = Rs. 100$	Payout ratio 80% $\Rightarrow D = 8$ $P = \frac{8 + (10 - 8) \times .05/.1}{0.1} = Rs. 90$
Payout ratio 100% $\Rightarrow D = 0$ $P = \frac{10 + (10 - 10) \times .2/.1}{0.1} = Rs. 100$	Payout ratio 100% $\Rightarrow D = 0$ $P = \frac{10 + (10 - 10) \times .1/.1}{0.1} = Rs. 100$	Payout ratio 100% $\Rightarrow D = 0$ $P = \frac{10 + (10 - 10) \times .05/.1}{0.1} = Rs. 100$

How is the Walter's model applied in deciding the optimum dividend payout is explained in the next section.

Now let us understand what are growth firms, normal firms and declining firms.

### Growth Firms:

Growth firms are characterized by the fact that rates of return of the firm is more than its cost of capital and these firms grow at rapid rate because they have ample investment opportunities which yield returns higher than cost of capital. Since these firms have ample investment opportunities implying that they have requirement for funds and given the constraints of Walter's model the only alternative available is to use the funds garnered through retained earnings. Analyzing table 14.1 clearly reveals that for growth firms the market price would be maximized when the firm opts for 0% payout ratio (retains all earnings and reinvest them) and minimized when the firm opts for 100% payout ratio (distributes all earnings among the shareholders).

### Normal Firms:

Normal firms are characterized by the fact that the rate of return earned by the firm is equal to its cost of capital. For normal firms where  $r = k$  the dividend policy has no effect on the market price of the share of the firm. An analysis of Column 2 of table 14.1 clearly shows that change of the payout

ratio (dividend policy) the share price of a normal firm do not change, thus for a normal firm there is no unique optimum payout ratio.

### **Declining Firm:**

Declining firms are characterized by the fact that the firms rate of return is less than the minimum rate required ( $r < k$ ) by the investors. Investors in such firms would prefer earnings to be distributed to them so that they can invest the same elsewhere to get a return higher than earned by the declining firm.

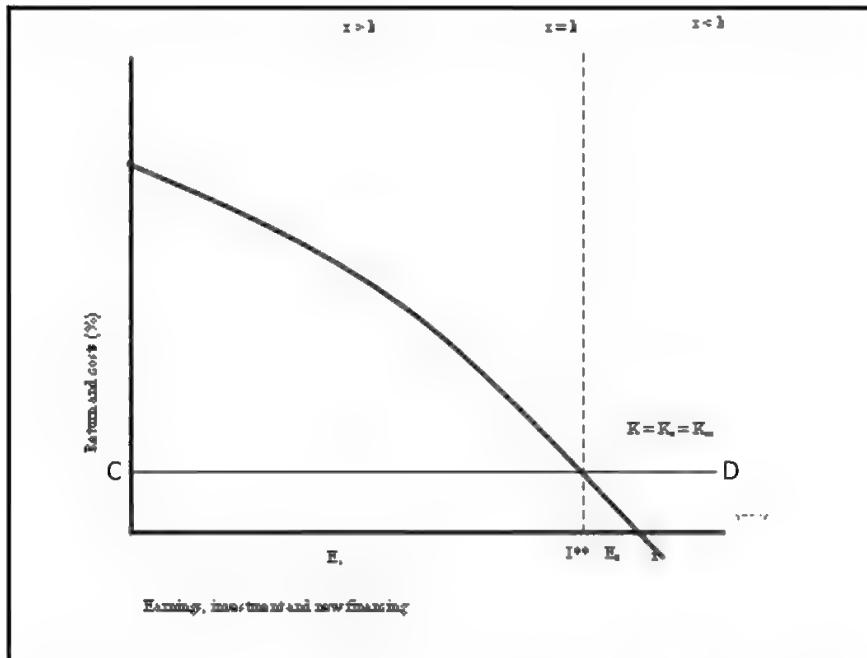
The price of equity share would be maximum when the firm decides to have maximum payout ratio. This is because of the simple reason that the investors are in a better position as compared to firm to earn a higher rate of return. The optimum payout ratio for such firms is 100% i.e. zero retained earnings. The price of the share increases as payout ratio increases.

From table 14.1 we can infer that as per the Walter's model:

- 1) When the rate of return is greater than the cost of capital ( $r > k$ ) the equity price is going to increase with increase in retention ratio or the price per share increases as the dividend payout ratio decreases. The optimal payout ratio for growth firms is 0%.
- 2) When the rate of return is equal to cost of capital ( $r = k$ ) the price per share does not vary with changes in dividend payout ratio. The retention ratio or payout ratio does not have any bearing on the share price. The payout ratio for normal firm is irrelevant.
- 3) When the rate of return is less than the cost of capital the price per share will increase with increase in payout ratio. The optimal payout ratio for declining firm is 100%.
- 4) One interesting thing you must have noted in the last row of table 14.1 that is when payout ratio is 100% there is no difference in share price of these three firms inspite of the fact that these three firms are generating different returns.

### **Critical Analysis of Walter's Model**

Walter's model derives the relationship between dividend, rate of return and cost of capital for all equity firm. The simplified and restrictive assumptions can lead to conclusions that are not true in general. The three basic assumptions of no external financing, constant return and constant opportunity cost of capital do not behave as assumed in the model. In order to understand how these assumptions deviate in real world let us look at and understand figure 14.1.



**Fig 14.1 Returns and Investment Relationship**

The vertical axis represents rate of return and cost of capital whereas the horizontal axis represents earnings and investments. The curve EF represents returns at varying level of investments .The rate of return ( $r$ ) on investment opportunities available to the firm are assumed to be decreasing. Line CD represents cost of capital and is assumed to be constant irrespective of the amount of new capital. Now let us discuss how these assumptions deviate.

- No external financing:** In the Walter's model investment policy of the firm is contingent upon the dividend policy of the firm. It is assumed in the model that the new investment is financed through the retained earnings only and no external financing debt or equity is used. In such a situation either the firm's investment policy or dividend policy or both are going to be suboptimal. When the rate of return on new investment is assumed to be decreasing, it implies that the most profitable investment is made first and poorer investments are made thereafter. From figure 14.1 we can see that optimum level of investment  $I_1$  occurs when  $r = k$ . Since the earnings of the firm is  $E_1$  which is less than  $I_1$  the firm will need to raise  $(I_1 - E_1)$  amount of capital from external sources to reach to optimum investment level. But in Walter's model there is no provision for access to external financing, therefore investment policy formulated as per Walter's model would result in sub optimal investment policy.
- Constant return ( $r$ ):** In this model It is assumed that rate of return ( $r$ ) is constant whereas in reality  $r$  decreases as the quantum of investment increases. The firm should stop making fresh investment when  $r$  becomes less than  $k$ (cost of capital).Now assume that firms earnings are  $E_2$ , which is greater than  $I_1$  viz. $E_2>I_1$ . One of the assumptions of Walter's model is either 100% payout or 100% retention. In case of 100% payout new optimum investment of  $I_1$  can't be made. In case of 100% retention new optimum investment of  $I_1$  can be made leaving a surplus of  $E_2-I_1$ .This surplus of  $E_2-I_1$  if invested will earn a return  $r < k$ . This would result in

erosion of owners or equity holder's wealth. The optimum policy would have been an investment of  $I_1$  and distribution of surplus of  $E_2 - I_1$  as dividend, but this is not allowed as per Walter's model thereby failing to optimize owner's wealth.

- c) **Constant opportunity cost of capital (k):** In Walter's model it is assumed that cost of capital  $k$  is constant, but in reality it is not so. Firm's cost of capital varies with the firm's risk. The present value of the firm's income moves inversely with the cost of capital. By assuming a constant  $k$  Walter's model fails to incorporate the element of risk in valuation.

### Check Your Progress B

- 1) Explain the essence of Walter's model.

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- 2) List the assumptions underlying the Walter's model.

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- 3) Critically analyse the limitations of Walter's Model.

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## 14.4 GORDON'S MODEL

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Myron Gordon developed a stock valuation model using the dividend capitalization approach. This model tries to relate the market value of the firm to its dividend policy. This model is also based on certain assumptions just like Walter's model which are as follows:

- 1) **All equity firm:** The capital requirement of the firm is fulfilled through equity and it has no debt.
- 2) **No external financing:** The firm cannot raise capital from external sources, therefore only retained earnings can be used for expansion purpose.
- 3) **Constant return:** The rate of return for the firm remains constant throughout the life of the firm. This assumption ignores the marginal efficiency of investment.
- 4) **Constant cost of Capital:** The cost of capital for the firm remains constant throughout the life of the firm. This assumption ignores the

effect of change in the firm's risk class and its consecutive effect on firm's cost of capital.

- 5) **The growth rate of firm** is function of retention ratio and rate of return of the firm. It is product of retention ratio and rate of return. This assumption follows from assumption 2&3.
- 6) **Constant retention:** The retention ratio (fraction of earnings that the firms plough back) once decided is never changed i.e. it is constant through the life of the firm. From this we can further derive that the growth rate is constant forever.
- 7) **No taxes:** Corporate taxes do not exist.
- 8) **Perpetual earnings:** The firm and its stream of earnings are perpetual.
- 9) **Cost of capital is greater than the growth rate:** The dividend per share is expected to grow as result of retained earnings.

Based on the above assumptions Gordon's basic valuation formula is:

$$P_0 = \frac{E_1(1-b)}{k-br} \quad 14.6$$

Where,  $P_0$  = price per share at the beginning of year 0

$E_1$  = earning per share (EPS) at the end of year

$(1-b)$  = fraction of earnings the firm distributes by way of dividends

$b$  = fraction of earnings the firm ploughs back

$k$  = rate of return required by the shareholders

$r$  = rate of return earned by the firm on its investments

$g = br$  Which is growth rate of earnings and dividends.

The dividend per share in any year is equal to payout ratio  $(1-b)$  times earning per share i.e.  $Div_t = (1-b)E_t$  where  $b$  is the fraction of earnings of the firm reinvested by the firm at internal rate of return  $r$ . Reinvestment of retained earnings allows earnings to grow at  $g=br$  per period.

Now let us derive the Gordon's Model which is based on the dividend capitalization approach. As per the basic valuation model the present value of any asset (share) is the equal to the present value of an infinite stream of cash flows (dividends) expected to be received by the shareholders therefore:

$$P_0 = \frac{Div_1}{(1+k)} + \frac{Div_2}{(1+k)^2} + \frac{Div_3}{(1+k)^3} + \dots \frac{Div^\infty}{(1+k)^\infty} = \sum_{t=1}^{\infty} \frac{Div_0(1+g)^t}{(1+k)^t} \quad Eq. 14.7$$

Reinvestment of retained earning where  $Div_0$  is dividend at the end of year 0 results in earnings grow per period at the rate of  $g = br$ . Incorporating the growth in earnings and dividends as a result of retained earnings in Eq. 14.7 the present value of a share is determined as

$$P_0 = \frac{EPS_1(1-b)}{(1+k)} + \frac{EPS_2(1-b)}{(1+k)^2} + \frac{EPS_3(1-b)}{(1+k)^3} + \dots \frac{EPS_n(1-b)}{(1+k)^n}$$

On solving equation

$$P_0 = \frac{EPS_1(1-b)}{k-br} \quad 14.8$$

Equation 14.8 depicts the relationship of expected earnings per share, retained earnings, firm's rate of return and firms cost of capital. You must be wondering where the variable for dividend in the equation is. Dividend in this equation is depicted by  $b$ , which is the retention ratio calculated as (EPS Dividend)/ EPS,

Now let us analyse how the dividend policy as per Gordon's model effect the share prices of different firms viz., normal firms, growth firms and declining firms.

Now let us again analyse the case of a **normal firm** wherein the internal rate of return is equal to its cost of capital  $r = k$ . Under this condition equation 14.8 Can be expressed as follows

$$P_0 = \frac{EPS_1(1-b)}{k-br} = \frac{rA(1-b)}{k-br} \quad (14.9)$$

When  $r = k$   $EPS = rA$ , Where A is asset of the firm

$$\therefore P_0 = \frac{EPS_1(1-b)}{k-br} = \frac{rA(1-b)}{r(1-b)} = A \quad (14.9A)$$

Eq. 14.9 clearly shows that when  $r = k$  the firm's value is not dependent on earnings (EPS) nor on firm's risk as measured by  $k$  and dividend policy also has no impact on firm's value. Thus when  $r = k$  the firm's dividend policy is irrelevant in determining the firm's value and is solely dependent on the assets it holds. This when analyses in context of competitive conditions implies that the opportunity cost of capital  $k$  of firm shall be equal to the rate of return generally available to share holders if they choose to invest in shares of other similar companies. This further implies that only funds distributed by the company as way of dividend can be invested by shareholders in the shares of other comparable companies earning a rate equal to the firm's internal rate of return as a result the share holders neither lose nor gain as a consequence of firm's dividend policy.

Now let us consider the case of a **declining firm** where  $r < k$  viz cost of capital is greater than rates of return. By simple intuition we can arrive at conclusion that more the retained earnings the more the value of the company will fall as per eq. 14.9

$$P_0 = \frac{rA(1-b)}{k-br}$$

If the retention ratio  $b$  is zero viz. payout ratio is 100% eq. 14.9 becomes

$$P_0 = \frac{rA}{k}$$

Now if  $r < k$  then  $r < k < 1$  which implies that  $P_0$  price per share is less than the firm's investment per share in asset A. Now if the retention ratio is raised the price of the share is going to fall further. These results can be further explained as follows:

If the rate of return  $r$  is less than  $k$  the required rate of return by the shareholders; profit retention by the firm would lead to further fall in the price of the share as more and more investors would sell the shares and invest in shares providing  $r$  the required rate of return. Increase in retention ratio (less dividend) deprives the share holders to invest at higher rate elsewhere. In such a scenario the better way for the firms would be to follow a policy of contraction and disinvestment which involves not only transfer of net profit but also a part of the paid up capital.

Now let us consider the case of a **growth firm** where  $r > k$ . The value of the shares should increase when the retention ratio is increased. The reason being that with increase in retention ratio more capital is available and the increased capital also earns rate of return which is more than cost of capital. However under this model it is not possible to determine the optimum retention ratio. For example in eq. 14.9

$$P_0 = \frac{EPS_1(1-b)}{k-br}$$

If  $b = k/r$  the denominator  $k - br$  becomes 0 making  $P_0$  as negative which is not possible. The reason for these kind of results is the assumptions that  $r$  and  $k$  are constant which underlies the model. In order to derive meaningful conclusions the value of  $b$  should be less than  $k/r$  implying that it should be less than one as in growth firms  $r$  would always be greater than  $k$ .

Let us now understand how the Gordon's model operates under different retention ratios with the help of the following illustration. All the required data is given in the first row of table itself.

**Table 14.2: Dividend Policy and the Value of firm**

#### Basic Data

Growth Firm $r > k$ $r = .12$ $k = .08$ $EPS = Rs. 10$	Normal Firm $r = k$ $r = .12$ $k = .12$ $EPS = Rs. 10$	Declining Firm $r < k$ $r = .08$ $k = .12$ $EPS = Rs. 10$
Payout ratio 40% $g = br = .6 \times .12 = .072$ $P = 10(1 - .60)/.08 - .072$ $P = 4/.008 = 500$	Payout ratio 40% $g = br = .6 \times .12 = 0.72$ $P = 10(1 - .60)/.12 - .072$ $= 4/0.048 = Rs. 83.3$	Payout ratio 40% $g = br = .6 \times .08 = 0.048$ $P = 10(1 - 0.60)/.12 - .048$ $= 4/.072 = 55.55$
Payout ratio 60% $g = br = .4 \times .12 = 0.48$	Payout ratio 60%	Payout ratio 60%

$P = 10(1 - .4)/.08$ $- .048$	$g = br = .4 \times .12$ $= 0.048$	$g = br = .4 \times .08$ $= 0.32$
$P = 6/.032 = 187.5$	$P = 10(1 - .4)/.12$ $- .048$ $= 6/.072 = Rs. 83.3$	$P = 10(1 - 0.4)/.12$ $- .032$ $= 6/.088 = 68.18$
Payout ratio 90% $g = br = .1 \times .12$ $= 0.012$ $P = \frac{10(1 - 0.1)}{.08 - 0.012} = \frac{9}{0.068}$ $P = 132.35$	Payout ratio 90% $g = br = .1 \times .12 = 0.12$ $P = \frac{10(1 - 0.1)}{.12 - 0.012} = \frac{9}{0.108}$ $= Rs. 83.3$	Payout ratio 90% $g = br = .1 \times .08$ $= 0.008$ $P = 10(1 - .1)/.12$ $- 0.008$ $= 9/.0112 = 80.35$

Analysis of the table clearly shows that:

- 1) The growth firms characterized by  $r > k$  the decision to retain more earnings would result in the increase of the share price of the firm.
- 2) The declining firms characterized by  $r < k$  the decision to retain more earnings would result in the decrease of the share price and conversely the decision to distribute the earnings and capital back to share holders would lead to increase in price of the share of the firm.
- 3) For normal firms characterized by  $r = k$  the decision to retain or distribute the earnings has no bearing on the share price of the firm.

### Revised Model: The Bird-In-The-Hand Argument

According to Gordon's model dividend policy becomes irrelevant when rate of return ( $r$ ) is equivalent to cost of capital ( $k$ ) viz.  $r=k$ , when all other assumptions are held valid. In order to confirm to reality Gordon modified his basic model to factor in risk and uncertainty in his model. This revision was necessitated by the fact that there is a higher risk and uncertainty associated with further dividends in future. In order to incorporate risk and uncertainty of future dividends the discount rate applied to dividends increases with time. The Gordon's revised equation is

$$P_0 = \frac{\text{Div}_1}{(1+k_1)} + \frac{\text{Div}_2}{(1+k_2)^2} + \frac{\text{Div}_3}{(1+k_3)^3} + \dots \frac{\text{Div}_{\infty}}{(1+k)^{\infty}} = \sum_{t=1}^{\infty} \frac{\text{Div}_t}{(1+k_t)^t} \quad \text{Eq.14.10}$$

Where  $P_0$  is the price of the share when retention ratio is zero.

In the above equation  $k_1 < k_2 < k_3 < k_{t-1} < k_t$ .

If it is assumed that firm retains a fraction of earnings ( $b$ ), dividend per share will be equal to  $(1-b)$  EPS<sub>1</sub> in the first year. When the dividend is expected to grow at the rate of  $g=br$ , this is contingent upon retained earnings reinvested at  $r$  rate of return. The dividend in the second year would be  $\text{Div}_0(1+g)^2 = (1-b)\text{EPS}_1(1+br)^2$  similarly dividend for the third year would be  $\text{Div}_0(1+g)^3 = (1-b)\text{EPS}_1(1+br)^3$  and so on for the next years. Discounting these dividends at the corresponding discount rates of  $k_1, k_2, k_3, k_{t-1},$  and  $k_t$ . We obtain

$$P_b = P_0 = \frac{\text{Div}_0 (1+g)^1}{(1+k_1)^1} + \frac{\text{Div}_0 (1+g)^2}{(1+k_2)^2} + \frac{\text{Div}_0 (1+g)^3}{(1+k_3)^3} + \dots \frac{\text{Div}_0 (1+g)^n}{(1+k_n)^n}$$

$P_b$  is the price of share when the retention rate  $b$  is positive  $b>0$ . Since  $k_1 < k_2 < k_3 < k_{t-1} < k_t$ , the calculation of this equation becomes little complex. In order to make calculations simple we discount the dividend stream at an uniform rate of  $k^+$ , which is the weighted average of all  $k_t$ 's. Replacing  $k_1, k_2, k_3, k_{t-1}, k_t$  with  $k^+$ ,  $P_b$  becomes

$$P_b = \frac{\text{Div}_1}{(k^+ - g)} = \frac{(1-b)\text{EPS}_1}{(k^+ - br)}$$

Now the question which arises is whether  $P_b$  is greater or lower than  $P_0$ . Assuming that the firm's rate of return  $r$  equals the discount rate this model concludes that increase in earnings retention will result in lower share value. This result can be further explained by the assumption of investor's behavior that assumes that investors are risk averse and they consider future dividends as less certain than near dividends.

An extension of these assumptions lead us to the conclusion that distant dividends are discounted at higher rates than near dividends; increasing the retention ratio will lead to rising of average discount rate thereby lowering the share price.

### Check Your Progress C

- i) Explain Gordon's dividend model.

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- ii) Explain the assumptions and limitations of Gordon's Model

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- iii) Discuss the bird in the hand argument of dividend.

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## 14.5 LET US SUM UP

The relationship between dividend policy and share valuation is one of the most controversial and unresolved issue in corporate finance. Several views regarding relevance and irrelevance of dividends exist. In this unit we have discussed the views pertaining to relevance of dividends. Starting from the traditional position of Graham and Dodd which propounds that capital markets place more weight on dividends than on retained earnings for pricing of equity shares. The next widely accepted view is that of Walter, who through his model established the relationship of share prices with the rate of return, cost of capital and retention ratio. From Walter's model three major conclusions can be drawn:

- 1) When the rate of return is greater than cost of capital share price will increase with increase in retention ratio
- 2) When the rate of return is equal to the cost of capital the share price is unaffected by change in retention ratio.
- 3) When the rate of return is less than the cost of capital the share price decrease/increase with increase/decrease in retention ratio

Similarly Gordon's model consider dividend as relevant and reach to the same conclusion as that of Walter's model.

Gordon further revised his model to incorporate risk and uncertainty of future dividends and concluded that because of uncertainty of capital gains investors prefer current dividends and the market price of companies having high payout ratio will command a premium.

There is no consensus regarding relevance of dividends, however the companies will have to consider a number of factors before deciding on appropriate dividend policy.

## 14.6 KEY WORDS

**P/E ratio:** P/E ratio is calculated as the price of the share divided by earnings per share

**Growth shares:** Shares which gives low dividends but have a high potential for future capital gains

**Income shares:** Income shares are those shares which provide regular dividends

**Super normal growth:** Super normal growth is a period of higher earnings, for one year or more. Supernormal growth periods are normally of short duration as it is unsustainable over the long-term as competition and market saturation will lead to lower **growth** levels.

**Value of growth opportunities:** The net present *value of growth opportunities* (NPVGO) is a calculation of the net present **value** per share of

all future cash flows involved with ***growth opportunities*** such as new projects or ***potential*** acquisitions.

**Growth firms:** These firms are characterized by the fact that their growth rate of the firm is more than its return on capital

**Normal firms:** Normal firms are those firms whose growth rate is equal to its return on capital

**Declining firms:** Declining firms are those firms whose growth rate is less than its return on capital

**Retention ratio:** The percent of earnings retained by the firm and not distributed as dividend.

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## 14.7 SELF-ASSESSMENT QUESTIONS/EXERCISES

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- 1) Explain the Graham and Dodd model on relationship between dividend policy and share valuation.
- 2) High Dividend payout ratio go hand in hand with high price earnings ratio and low dividend payout ratio goes hand in hand with low price earnings ratio.” Analyze this statement in context of traditional position.
- 3) Explain the Walter’s valuation model. Discuss the logic behind this model.
- 4) Explain the implication of Walter’s model.
- 5) Discuss the assumptions which underlie the Gordon’s model of dividend effect.
- 6) Explain the Gordon’s basic valuation formula. How is it derived?
- 7) Explain the implications of Gordon’s basic model.
- 8) Explain the Gordon’s revised model. What are its implications.
- 9) From the following data of ABC Company calculate the price per share as per the Walter’s Valuation formula when the dividend payout ratio is 10%, 40%, 50%, 75% and 100%.

Earnings per share= Rs.4.5

Internal Rate of return =18%

Cost of capital =13%

- 10) From the following data of XYZ Company calculate the price per share as per the Gordon’s Basic Valuation formula when the dividend payout ratio is 10%, 40%, 50%, 75% and 100%.

Earnings per share= Rs.10.5

Rate of return on investment =24%

Rate of return required by the shareholders =18%

Hints for question 9

Use the equation:  $P = \frac{D}{k} + \frac{(E-D)\bar{r}}{k}$

Fill in the variables given in the question to find the answer.

Hints for question 10

Use the equation :  $P_0 = \frac{Y_0(1-b)}{k-br}$

Fill in the variables given in the question to find the answer.

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 15 DIVIDEND THEORIES-II**

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### **Structure**

- 15.0 Objectives
- 15.1 Introduction
- 15.2 Dividend Irrelevance: The Miller-Modigliani Hypothesis
  - 15.2.1 Criticism of MM Hypothesis
- 15.3 Uncertainty and Shareholders Preference for Dividends (Bird in Hand Hypothesis)
- 15.4 Low Dividend Increases Stock Value (Tax Effect Hypothesis)
- 15.5 Clientele Effects of Dividend Hypothesis
  - 15.5.1 Tax Induced Clientele Effect
  - 15.5.2 Transaction Cost Induced Clientele
- 15.6 Information Asymmetry: Agency Cost and Free Cash Flow Hypothesis of Dividend Policy
- 15.7 The Information Content of Dividends (Signalling Hypothesis)
- 15.8 Neutrality of Dividend Policy: Black and Scholes Hypothesis
- 15.9 Residual Theory of Dividend
- 15.10 Let Us Sum Up
- 15.11 Key Words
- 15.12 Self-Assesment Questions

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### **15.0 OBJECTIVES**

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After studying this unit, you should be able to:

- understand the irrelevance theory of dividends and how it establishes that value of firm is not dependent on dividends;
- critically evaluate the logic of dividend irrelevance;
- identify the market imperfections that makes dividend relevant;
- understand the clientele effect of dividends;
- critically evaluate the information content of dividends;
- discuss the effect of agency cost and free cash flow on dividends and
- explain the residual dividend theory.

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### **15.1 INTRODUCTION**

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In the previous unit we had analysed how the dividends impact the value of firms and establish the relevance of dividend policies. The dividend policies of the firms have evolved with the development of the corporate form of the

firms and business houses. The emergence of dividend policy was also shaped by the evolving state of financial markets and fiscal policies (taxation) of the nations. During the early years of emergence of corporate form of business, investing in shares was considered akin to investing in bonds so regularity in payment of dividends was considered necessary. Early form of corporate' development was characterized by absence of regular and accurate reporting of financial results and the quantum of dividends was gauge of corporate performance rather than the published financial information. In the absence of regular and accurate information, investors preferred dividends to retained earnings. However, as the financial markets evolved and developed becoming more mature and efficient there was a renewed debate regarding relevance of the dividend policy. Therefore till (1959) it was accepted that the value of a firm is a function of dividends it pays to the share holders. This proposition was challenged by Miller and Modigliani and the core of their argument was based on the premise that firms value is solely determined by firm's present and future cash flows and not by the ways these cash flows are apportioned between the share holders and firms.

## **15.2 DIVIDEND IRRELEVANCE: THE MILLER-MODIGLIANI (MM) HYPOTHESIS**

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According to MM hypothesis "under a perfect market, the dividend policy of a firm is solely dependent on its earning power which is a function of its investment policy and earning power is not dependent on the manner in which earnings are split between dividends and retained earnings.

In order to understand this let us analyse three situations which a firm may face while deciding on dividends. These are :

- i) The firm has enough cash to pay dividends.
- ii) The firm is short of cash to pay dividends and decides to issue new shares to finance payment of dividends.
- iii) The firm does not pay dividends but shareholders require dividends.

In the first case the firms pay dividend resulting in decrease in assets of the firm also simultaneously reducing the claim of the shareholders on the assets of the firm by the same amount. There is no net loss or gain to the share holders, the wealth of the shareholder will remain unaffected.

In the second case two transactions are taking place. In the first transaction the shareholders receive cash and simultaneously their claim on the assets of the firm also reduces by the same amount which results in no change in the net wealth of the investor. In the second transaction new investor buy shares at a fair price in cash. This transaction results in transfer of some of the claims of existing share holders to new share holders and the value of these claims is equal to the cash paid by the new share holders. The fair price is the share price before the payment of dividends minus dividends paid to the existing shareholders.

The value of the firm remains the same after completion of these transactions.

In the third case the share holder resorts to creating a **homemade** dividend by selling a part of his holding wherein the sales consideration would be equal to his dividend requirement. By creating homemade dividend existing share holder transfers for cash a part of his claim on firm's asset to new share holder. The net effect of this transaction is same as the second case and there is no change in value of the firm before and after the transaction.

In order to understand it in more clear way let us go through this example.

A limited company XYZ Ltd. currently has 6 crore outstanding shares selling at a market price of Rs. 300 per share. The firm is free of any debt and has Rs. 270 crore internal funds for capital expenditure. This capital expenditure of Rs. 270 crore is expected to yield a positive net present value of Rs. 180 crores. The firm plans to pay dividend of Rs. 45 per share. In view of the capital expenditure and dividend payments the firm will have to issue new shares to finance payment of dividends. How will the firm's value be affected if:

- i) If it does not pay any dividend.
- ii) If it pays dividend of Rs. 45 per share

The firm's present value is =  $6 \times 300 =$  Rs. 1800 cr

The firm's value after capital expenditure=  $1800 + 180 = 1980$  cr

If the firm does not pay any dividend the value per share after capital expenditure would be:

$$\frac{1980 \text{ cr}}{6 \text{ cr}} = \text{Rs. } 330$$

Now if the firm pays dividend of Rs. 45 per share it will entirely utilize its internal funds of Rs. 270 crore and it will have to raise Rs. 270 crore per capital expenditure by issue of new shares.

The value of shares after paying dividend of Rs. 45 would be  $330 - 45 =$  Rs. 285

The existing shareholders receive a cash of Rs. 45 and simultaneously suffer a capital loss of Rs. 45 in the form of reduced share value. The share holders neither gain nor lose. The firm will have to issue  $\frac{270 \text{ crore}}{285}$  (94,73,684 lakh) shares. Now, the firm has 6+.9473685 crore shares at Rs. 285 per share. The value of the firm is  $285 \times 6.9473685 \text{ cr} = 1979.9999 \text{ cr} \cong 1980 \text{ crore}$ .

With the above example let us briefly discuss the central focal argument of MM hypothesis which is that the share holders are not merely dependent of dividends for obtaining cash they can do so by selling a part of their holdings which would be equivalent to the expected dividends. This homemade dividend does not dilute the net wealth of the investors. This is possible in perfect markets where there is absence of taxes, floatation cost and transaction cost. Now, let us derive the MM hypothesis, which is based on the following assumptions.

- 1) **Perfect Capital Market:** Perfect markets are characterised by rational behaviour of investors, absence of information asymmetry i.e. information is freely available to all. Transaction and floating cost is nil. In perfect market no buyer or seller is large enough to affect the market price of the securities.
- 2) **No Taxes:** No taxes are levied on income and also there are no differential tax rates for capital gains and dividends. This implies that investor is indifferent to the way income accrues to him either in form of capital gains or dividend.
- 3) **Investment Policy:** The firm has fixed investment policy which implies that investment opportunities and future profits of firms are known with certainty.
- 4) **No Risk:** Uncertainty regarding discount rate does not exist which implies that future prices and dividends can be forecasted with certainty and in addition one discount rate can be used for all securities and all time periods. This leads to  $r=k=k_t$  for all  $t$ .

As discussed above the substance of MM argument is that in case firm decides to retain its earnings instead of distributing it as dividends the share price of firms share will appreciate by the amount of retained earnings per share. If the firm decides to distribute earnings by way of dividends the share holders would accrue an income equal in value to the amount by which the share prices would have appreciated had the firm chosen to retain its earnings. This implies that for share holders it is irrelevant whether the firm retains its earnings or distributes it by way of dividends. To prove their argument MM begins with the simple valuation model

$$P_0 = \frac{1}{(1+k)} (D_1 + P_1) \quad (15.1)$$

Where  $P_0$ = market price per share at time 0

$P_1$ = market price per share at time 1

$D_1$ =dividend per share at time 1

$k$ = discount rate applicable to the risk class to which firm belongs, this rate is assumed to remain unchanged.

Now as per the MM assumptions rate of return  $r$  is equal to discount rate  $k$  (identical for all shares); this would result into adjustment of share price so that the rate of return comprising of dividends and capital gains per share equals to the discount rate. The rate of return per share on share held for one year would be

$$\begin{aligned} r &= \frac{\text{Dividends} + \text{Capital gain or loss}}{\text{Share price at time } 0} \\ r &= \frac{D_1 + P_1 - P_0}{P_0} \end{aligned} \quad (15.2)$$

Before proceeding further let us discuss why  $r$  which is rate of return is equal for all shares. If  $r$  is not equal for all securities the investors holding low

return yielding securities will sell these securities and invest in high yielding securities. This process would lead to lowering of the price of low yielding securities and increase in the price of high yielding securities. This process which is known as switching or arbitrage is self propelled and will continue till the differential in rates of return is completely diminished to zero. Apart from rate of return the discount rate for all firms will also be same as there is no risk difference among the firms.

Now let us derive the value of the firm at time 0 if no new external financing exist. Multiplying eq. 15.1 on both the sides by number of shares outstanding (n) we get

$$V = np_0 = n \times \frac{(D_1 + P_1)}{(1+k)} \quad (15.3)$$

Now if the firm has access to external finance by issuance of (m) new equity shares at time 1 at a price of  $P_1$ ; the value of the firm at time 0 would be

$$\begin{aligned} np_0 &= \frac{n(D_1 + P_1) + mp_1 - mp_1}{(1+k)} \\ &= \frac{nD_1 + nP_1 + mp_1 - mp_1}{(1+k)} \\ &= \frac{nD_1 + (n+m)p_1 - mp_1}{(1+k)} \end{aligned} \quad (15.4)$$

Equation 15.4 factors in issuance of new equity shares which is in contrast to Gordon's and Walter's model. In MM model a firm can simultaneously pay dividends and raise funds by issue of new shares to undertake an optimum investment policy thus in this model the investment by firms can be either financed by retained earnings or by raising of capital by issuance of new shares.

Now, how is the quantum of new shares which are to be issued to finance investment is decided. For example if the firm's investment requirements is Rs. 100 crores, its net profit is Rs. 80 crores and it wishes to distribute Rs. 50 crores as dividends then it will have to raise Rs. 70 crore. Put in mathematical form the equation for this calculation would be

$$mP_1 = I_1 - (X_1 - nD_1) = I_1 - X_1 + nD_1 \quad (15.5)$$

$$= 100 - 80 + 50 = 70$$

where  $I_1$  represents the total amount of investment during the first period and  $X_1$  is the total net profit of the firm during period 1.

Substituting the value of  $mP_1$  obtained in eq. 15.5 in eq. 15.4 we get

$$\begin{aligned} np_0 &= \frac{nD_1 + (n+m)p_1 - (I_1 - X_1 + nD_1)}{(1+k)} \\ &= \frac{nD_1 + nP_1 + mp_1 - I_1 + X_1 - nD_1}{(1+k)} \\ &= \frac{(n+m)p_1 + X_1 - I_1}{(1+k)} \end{aligned} \quad (15.6)$$

In equation 15.6  $D_1$  is not anywhere and other variables ( $n+m$ ),  $P_1$ ,  $X_1$  and  $I_1$  are independent of  $D_1$ , MM reached the conclusion that the value of the firm is not dependent on its dividend decision.

Before proceeding further few things should be noted.

The MM dividend irrelevance hypothesis is an extension of MM ‘leverage irrelevance’ hypothesis. In the above derivation of MM dividend irrelevance hypothesis, it was assumed that the external finance is raised by issuance of additional equity; However even if the additional finance is raised by issuance of debt or combination of debt and equity it will have no impact on the final result as the real cost of debt and equity is same as per the MM leverage irrelevance hypothesis.

The traditional approach to valuation the dividend capitalization approach is not in conflict with the MM hypothesis. As per the dividend capitalization approach the value of share/security is equal to the present value of the future stream of expected dividends. The MM hypothesis envisages that the dividend policy of a firm influences the timing and magnitude of dividend payments but these decisions cannot change the present value of the total stream of dividends.

To sum up the MM’s argument that the dividend policy does not affect the wealth of share holders consider a firm having future investment plans and decides to pay dividends also implying that it has to raise additional funds to simultaneously carry out both of these. The advantage of paying dividends is offset by external financing. The terminal value of shares decline by the amount of dividends paid thus the wealth of the shareholders after payment of dividend and external financing is equal to the present value per share before the payment of dividends. This fact makes share holders indifferent to payment of dividends or retention of earnings.

### **Example 15.1:**

Silent and Humming Co. Ltd., currently has 3 lakhs outstanding shares with market price of Rs. 300 per share. The company has net profit of Rs. 90 lakhs and investment plans of Rs. 180 lakhs for the next year. The company wishes to declare a dividend of Rs. 45 per share at the end of the current year. The firms opportunity cost of capital is 10 per cent. What would be the price of the share if

- i) dividend is not declared
- ii) dividend is declared
- iii) how many new shares are issued to finance investment

### **Solution:**

- i) The price of the share at the end of year when no dividend is paid

$$P_o = \frac{D_1 + P_1}{(1+k)} \Rightarrow P_o (1+k) - D_1 = P_1$$

$$P_1 = 300 (1.10) - 0 = \text{Rs. } 330$$

- ii) The price of the share at the end of year when dividend is paid

$$P_1 = 300 (1.10) - 45 = \text{Rs. } 285$$

Note that in both the cases net wealth of the share holders remains unchanged

- iii) Number of shares to be issued to finance new investment

$$mP_1 = I - (x - nD_1) \Rightarrow m = \frac{I - (x - nD_1)}{P_1}$$

$$m = \frac{180 - (90 - 3 \times 45)}{285}$$

$$m = \frac{180 + 45}{285}$$

$$m = 78948 \text{ new shares}$$

### 15.2.1 Criticism of MM Hypothesis

Modigliani and Miller hypothesis is logically consistent theory on dividend policy. The MM hypothesis is based on certain simplifying assumptions and is an extension of the proposition of perfect competition. When the assumptions of perfect competition are relaxed to factor in the real conditions in which firms operate MM hypothesis fails to incorporate or factor these conditions. Secondly another crucial assumption of external and internal financing being perfect substitute for each does not really hold when the firms operate in real world as in reality flotation cost and transaction cost do exist and transaction cost such as commissions, brokerage, security transaction tax, stamp duty etc. can be substantial for small transactions. Taxes exist and there are different tax rates for dividends and capital gain. The presence of tax differential with a positive bias on capital gains vis-à-vis dividends also adds to non conformity to real conditions. Information is not freely available and information asymmetry does exist between share holders and managers which gives rise to agency cost. Dividends have information contents and they do contribute to mitigate the agency cost. All these deviations from the assumptions underlying the MM hypothesis vitiate the validity of the MM hypothesis.

In the next sections we are going to discuss some of the hypotheses which analyse these deviations and suggest that how each of these factors make the dividend policy relevant for the firm and the shareholders.

#### Check your Progress A

- 1) Explain the concept of homemade dividends.

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- 2) Explain the focal argument about dividend irrelevance
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### **15.3 UNCERTAINTY AND SHAREHOLDER'S PREFERENCE FOR DIVIDENDS (Bird in Hand Hypothesis)**

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Firms operate in dynamic environment and as a result this gives rise to perception of uncertainty in the mind of investors regarding cash flows of the firm. This perception of uncertainty is often addressed by dividend decisions/policy. As argued by Gordon and others that dividends are relevant under conditions of uncertainty. As uncertainty increases with time horizon and investors are risk averse, they prefer present dividends (bird in hand) to future dividends or capital gains (two in the bush). The preference for present dividends lead to discounting of future dividends at higher discount rate than near dividends. The consequence of this is that the firms having high payout ratio (higher dividends) will command a higher value than the firms having low payout ratio. This leads to existence of high-payout clientele, who values share of firms paying high dividends more than those firms which abstain from paying dividends or has low payout ratio.

They further argued that dividend policy does not alter the risk of the cash flows from investments; rather the dividend policy merely splits these cash flows in dividends and retained earnings. They further contended that shareholders prefer current dividends because they require a steady source of income. Some investors prefer dividends because in absence of proper corporate governance, the present dividends are the best insurance against future lapses in corporate governance. Generally investors are risk averse and they minimise their risk through diversification. The present dividends provide funds to investors to diversify among different asset classes.

M&M were not convinced with the above arguments and countered these arguments, that even if the assumption of perfect certainty is dropped from their hypothesis even then dividend policy will remain irrelevant. The central focus of their argument is that two firms with identical capital structure, investment and risk profile can't command different prices merely because they follow different dividend policies, due to the fact that they will have the same cash flows from their investments. Consequently they referred to bird in hand argument as fallacy. Other studies too support the MM hypothesis and argue that the riskiness of firm's cash flow influences its dividend payments and increase in dividend payment does not reduce the risk of the firm. Theoretically it is evident that the firms facing higher risk tend to adopt lower payout ratio and there exists negative relationship between firms risk and

dividends implying that as the firms risk increases the dividend payment decreases.

## **15.4 LOW DIVIDEND INCREASES STOCK VALUE (TAX EFFECT HYPOTHESIS)**

One of the assumptions of MM hypothesis is that there are no taxes and extension of this is that there is no difference between tax on capital gains and dividends, thereby excluding any possible tax effect in their analysis. However in real world taxes do exist and there is difference of tax rates on dividend income and capital gains.

In India the scheme for charging tax on dividends is going under transformation since 1997 when dividend distribution tax was introduced and the companies were made to pay taxes on dividends at flat rate irrespective of the tax bracket in which the investor falls. From the financial year 2020 the dividend distribution tax has been abolished and now the dividends are taxable in the hands of shareholders at the slab rate applicable to them. This rate can at the maximum go to 35.88% for individuals. The short term capital gains are taxed at 15% and long term capital gains are taxed at 10% plus 4% cess on tax.

To understand how the tax may impact the after tax returns on securities let us go through the following example.

### **Example 15.2**

Let us assume that Mr.X has invested Rs.10 crores in a certain share listed on recognized stock exchange. He had bought the securities at price of Rs.200 per share on 1<sup>st</sup> April 2020. Calculate his tax liability if the :

- 1) Company declares a dividend of Rs.30 per share in the financial year 2020-21.
- 2) Company has EPS of Rs.30 per share and chooses to retain all the earnings and as the result of retention share prices goes up to Rs.230 on 30/03/2021 and he choose to sell the share on that date at that price.
- 3) He chooses to sell the share on 04/05/2021 when the share price is Rs.230.

### **Solution:**

- 1) In the first case his income is going to be  $5,00,000 \times 30 = ₹1,50,000,00$   
 His tax liability would be  $1,50,000,00 \times .3588 = ₹53,82,000$   
 His after tax return would be  $1,50,000,00 - 53,82,000 = ₹96,18,000$
- 2) In the second case his income is going to be  $5,00,000 \times 30 = ₹1,50,000,00$   
 His tax liability would be  $1,50,000,00 \times .15 = ₹22,50,000$   
 His after tax return would be  $1,50,000,00 - 22,50,000 = ₹1,27,50,000$
- 3) In the third case his income is going to be  $5,00,000 \times 30 = ₹1,50,000,00$

His tax liability would be  $1,50,000.00 \times .104 = ₹15,60,000$

His after tax return would be  $1,50,000.00 - 15,60,000 = ₹1,34,40,000$

From the above example it is clear that when dividends are taxed at higher rates than that on capital gains, taxable individual and institutions will be better off and their post tax returns will be higher if they do not receive dividend but get their returns in the form of capital gains which partly arise from retained earnings.

The tax effect hypothesis further suggest that as a result of low dividends companies are able to retain earnings which brings down their cost of capital thereby increasing the future earnings which then results in higher stock prices. In addition dividends are taxed immediately in the financial year in which they accrue to the investors whereas in case of capital gains taxes are deferred until the stock is actually sold. The tax advantage of capital gains over dividends attract investors who have advantageous tax treatment on capital gains and they are even willing to pay premium for low dividend paying stocks having high earning per share. If the dividends are taxed at higher rates than capital gains investors in higher tax bracket would require higher pre tax risk adjusted return to invest/hold shares with higher dividend yield or low retention ratio.

The assertions of tax effect hypothesis are in direct conflict with bird in hand argument and also challenge the strict form of MM hypothesis. The dividend policy becomes relevant when there is tax differential between dividends and capital gains

### Check Your Progress B

- 1) How do tax differential create high payout and low payout clientele?

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## 15.5 CLIENTELE EFFECTS OF DIVIDEND HYPOTHESIS

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Miller and Modigliani in their Dividend Irrelevance Hypothesis had agreed to the fact there exists dividend clientele effect and this may play a role in dividend policy under certain conditions. Market imperfections such as different taxes for dividends and capital gains, transaction costs, etc may influence the portfolio choice of investors and investors will tend to choose securities that reduce the cost associated with these market imperfections. The tendency of investors to be attracted to a certain type of dividend paying stocks was termed as “dividend clientele effect” In spite of agreeing to the existence of dividend clientele hypothesis and its effect on dividend policy, M&M maintained that in a perfect market each of the clientele is as good as

another hence the firms value remains unaffected by existence of clientele effect implying that dividend policy is irrelevant.

Based on different investors situation and market imperfection create two broad category of clienteles which are:

- 1) Tax minimization induced clientele
- 2) Transaction cost minimization induced clientele

The investors would be attracted to those firms whose dividend policies are in sync with their own needs and requirement. For example firms operating in high growth industry are likely to pay less dividends and will attract investors who are not risk averse and prefer capital gains over dividends. On the other hand firms which are at maturity stage are likely to give higher dividends and will attract investors who have preference for current dividends and are also risk averse. Institutional investors are likely to be attracted towards dividend paying stocks.

#### **15.5.1 Tax Induced Clientele Effect**

Since investors are interested in after tax returns, the incidence of taxation might affect their demand for dividends. The differential in tax rates on dividend and capital gains will drive the investors to those stocks in which after tax returns are going to be high. Taxes may also affect the supply of dividends as managers are more concerned to maximize shareholders wealth (firm value). Firm value can be increased by increasing the retention ratio.

The investors who require current income and steady source of income are likely to invest in stocks which provide regular and steady income, whereas investors in high tax bracket are likely to invest in stocks which pay low dividends but have potential for capital gains through price appreciation.

#### **15.5.2 Transaction Cost Induced Clientele Effect**

One of the assumptions of MM hypothesis is that the external financing (issue of new financial instruments) and internal financing (retained earnings) are equivalent since there is no transaction cost. The implication of this assumption is that when firm pays dividend they can finance their investment gap by issuing new financial instruments. Further implication of this is that the wealth of the shareholders remains unaffected irrespective of the fact whether the firm retains earnings or issue new financial instruments. Now in the real world this position is not substantiated as the flotation or issue cost includes cost involved in preparation and issue of prospectus, underwriting fees, broker commission and under pricing of the financing instrument. Now if we consider the floatation cost which is an inescapable reality, then internal and external financing is not equivalent. External financing is costlier than the internal financing due to the presence of transaction costs. Another aspect of transaction cost on dividend policy which needs to be taken into consideration is that the firms may need to restore the cash (funds) distributed as dividends by issuing new equity or debt to make optimum utilization of new investment opportunities. Now if the issuance cost is

significant the firms will choose to rely on retained earnings and as a result dividend policy is going to be impacted and will result in low payout ratio. One may assume that firms of developed countries may pay liberal dividends due to ease of transactions, low interest rates, and lower cost of raising new capital; but it is not true. Even in developed countries major source of firm's finance is retained earnings. A study by Fazzari, Hubbard and Petersen (1988) found that over period of 1970-1984 U.S. manufacturing companies the retained earnings accounted for 71% of the total sources of funds of U.S. manufacturing companies with an average retention ratio of 60 percent. By retention of earnings firms can lower their cost of capital, but in practice many of the firms continue to pay dividends and simultaneously raise capital from external sources thereby suggesting that many other factors come into play while deciding dividend policy.

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## **15.6 INFORMATION ASYMMETRY: AGENCY COST AND FREE CASH FLOW HYPOTHESIS OF DIVIDEND POLICY**

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The management of the firm concerned with day to day operations and strategic planning has complete information and insight about the prospects of the firm, which they may choose to convey or not to convey to the shareholders. This gap between information available to management and information available to shareholders is referred to as Information Asymmetry. The presence of information asymmetry gives rise to conflict between managers and shareholders. When the owners of the firm (shareholders) are distinct from its management the managers are imperfect agents of the owners. This fact is in conflict with one of the assumptions of MM's hypothesis viz. there is no conflict of interest between management and owners.

The agency problem arises because the interest of the management is not always aligned with that of the shareholders and management may indulge in actions that may be prejudicial to the interest of the shareholders. Examples of such actions are awarding excessive compensation, perquisites and non pecuniary benefits to themselves or investing in projects which are managerially rewarding in the short run but unprofitable in the long run.

Shareholders incur agency cost to monitor managers, these costs can be reduced through binding contracts and limiting the powers of manager in fixing of remuneration and perquisites. The management of these agency costs can also be addressed through dividend policy. Dividend policy may align the interest of the shareholders and managers. Dividend policy can reduce the agency problem by reducing the discretionary funds at the disposal of the managers. Another aspect of agency problem is the conflict between the bondholders and shareholders. Bondholders would like to ensure that they receive the interest and principal payment on time and would not appreciate that shareholders be paid excessive dividends endangering their interest and principal repayment schedule. Excessive dividend payment would be seen as shareholders expropriating wealth from bondholders. To safeguard their

interest bondholders prefer to put constraints on excessive dividend payments to secure their claims. Vice versa for the same reasons shareholders would prefer large dividend payments.

Another aspect of agency cost is the free cash flows available to the managers. Dividend policy can be used to reduce the free cash flows at the discretion of managers. Large dividends result in reduction of free cash flows available to the management thereby necessitating raising funds from external sources for future investment. Raising funds from external sources expose the management to scrutiny by outsiders such as bankers and financial analysts. Thus higher dividend payments increases management's scrutiny by outsiders along with the shareholders thereby reducing the agency cost. However there is a flip side to this line of argument. Large dividend payments may increase firm's leverage thereby increasing the riskiness of the firm.

Manager's having excess free cash flows have a tendency to enlarge the size of the firm, sometimes by investing in negative NPV projects. This overinvestment problem can be addressed by extracting excess free cash flows in the form of dividends.

Now coming to MM hypothesis, it is suggested in MM hypothesis that firm's investment policy is independent of its dividends policy. When we interrelate MM hypothesis with free cash flow hypothesis the above stated assumptions of MM hypothesis does not hold. On payment of dividends the value of the firm is going to increase on two counts:

- 1) Increase in dividends will lead to increase in value of firm as near dividends are discounted at lower rates as compared to future dividends.
- 2) Increase in dividends will reduce overinvestment problem which is going to have positive impact on the value of the firm.

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## **15.7 INFORMATION CONTENT OF DIVIDENDS: SIGNALING HYPOTHESIS**

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In the previous section we had discussed about information asymmetry that exists between managers and shareholders. Consequence of information asymmetry manifests itself in the form of agency problem. In the MM hypothesis it is assumed that all the stakeholders in the firm have free, equal and instantaneous access to the same information regarding firm's performance and future prospects. This is not the case in reality as the management will have superior access to facts and information. As a result of this information asymmetry the true intrinsic value of the firm may not be available to the market and share price may not be the accurate measure of the firm's value. Now in order to reduce this information asymmetry the management must share/transfer their private information with the outsiders (shareholders) so that they can assess the real value of the firm. The complete and accurate information to which the management is privy to is often not available to the shareholders, therefore the investor relies on the cash flow (dividend) associated with the security to value the share. In this way

dividend act as a proxy for information associated with firm's earning prospects. Other way round dividend is also a tool in the hands of the management through which they convey their private information to the shareholders. The dividend policy and the changes in the dividend policy convey implicit information about the firm's future earnings potential. This proposition that dividend conveys implicit information is known as 'information content of dividends' or 'signaling hypothesis' .

For signaling hypothesis to operate in the market in efficient way there are certain conditions which should be present which are as follows:

- 1) Management should possess private information about the firm's future prospects.
- 2) Management should have incentive to convey this information to the shareholders.
- 3) Signals generated by dividend announcement must be true.
- 4) Firms with poor future prospects should not be able to mimic and send false signals to the market by increasing dividends
- 5) Market must be able to rely on signals to differentiate firms based on their future earning potential.

Management uses dividend announcement to convey information about the future earnings and growth prospects and also about the sustainability of earnings and growth. An increase in dividend payout may be perceived by investors that the firm's income curve has shifted upwards and likely to remain there in near future, this may result in increase of share price and vice versa decrease in dividend payout signals just the opposite.

Generally dividends are sticky viz. they do not change in response to temporary increase/decrease in earnings. Managers usually hesitate to change the dividend payout ratio until and unless they are convinced that change in income of the firm is permanent and sustainable in the long run. This line of argument is also consistent with "dividend smoothing hypothesis" which states that "managers will Endeavour to smooth dividends over time and not make substantial increase in dividends unless they can maintain the increased dividends in the foreseeable future". Increase in dividend payout generally reflects the confidence of management that the increased dividends can be sustained by future earnings.

Relying exclusively on the signal generated by change in dividend payout ratio shall be avoided as sometimes the signals generated may be ambiguous. Take for example a firm is considering to invest in a new project which is going to generate positive NPV, but since the discussions are at a preliminary stage the firm does not want to disclose the same to the shareholders. To finance this new investment, the firm wants to conserve cash by slashing the dividends drastically. The decrease or omission of dividends may give signal to the investors that something is not correct on the earning front; but when dividend decision are seen in conjugation with net profit there may emerge a clear picture regarding firms future prospects.

Various studies have found that dividends are considered as a credible signaling device because of the dissipative cost involved in dividend decisions. The dissipative costs include:

- 1) Transaction cost involved with external financing
- 2) Distortion in optimal investment decisions
- 3) Tax penalty (disadvantage) on dividends relative to capital gains.

In light of the dissipative cost involved in dividend decisions, only good quality firms which are undervalued can use dividends as tools to communicate future prospects of the firm, whereas poor quality firms can't use the dividend signal to mimic good quality firms to send false signals to market as substantial cost is involved in executing dividend decisions.

When signaling hypothesis is taken into consideration to design the dividend policy, the most effective dividend policy is going to be the one that provide information to the investors which can't be otherwise communicated through other means.

One of the major criticism of dividend signaling hypothesis is that why the firms choose dividend as signaling tool whereas other less costly options like share repurchase are available to the firms.

#### **Check Your Progress C**

- 1) In the context of dividend policy, explain the influence of information asymmetry and agency costs.
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#### **15.8 NEUTRALITY OF DIVIDEND POLICY: THE BLACK AND SCHOLES HYPOTHESIS**

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Dividend relevance school of thought explain the benefits of dividends as to, fulfill the desire for current income, eliminate the need to restore to homemade dividends thereby reducing the transaction cost and signal the firm's prospects and risk which allow the shareholders to make rational choices regarding investment portfolio.

The cost to investors associated with dividends is that they are taxed at higher rates as compared to capital gains. Black and Scholes argue that investors make rational decisions and trade off the benefits of dividends against tax liability. Based on the degree of trade off the investor chooses to make them, can be classified into three clienteles or groups :

- 1) A clientele that favours receiving dividends
- 2) A clientele that does not favour receiving dividends
- 3) A clientele that is indifferent towards receiving dividends

This inclination of receiving dividends or not receiving dividends is contingent upon clientele requirement for current income and the tax bracket in which they fall.

Clientele who require current income and are in low tax bracket would prefer shares that have high payout ratio viz. which pays high quantum of dividends. They may face marginal tax disadvantage if due to dividends their income category changes from tax exempt to taxable category.

Clientele who are in the highest tax bracket, would not favour receiving dividends as they face tax disadvantage as the dividend income would be taxed at higher rates as compared to capital gains and their effective dividend income would come down.

Tax exempt individual and institution are indifferent towards dividends.

In real world situation all the three types of clientele exist and there exists hundred of companies whose dividend policy would match with the expectations of these clientele. Black and Scholes argue that there exist companies whose dividend policy would satisfy the needs of the clientele. The companies would not gain anything if they choose to change their dividends policy as the investors have already chosen the firms that satisfy their needs or there exists opportunities for shareholders to shift from one firm to another.

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## 15.9 RESIDUAL THEORY OF DIVIDEND

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As per MM hypothesis investment and dividend decisions are independent of each other, but in reality dividend, investment and financing are interdependent. In the long run trade off must be made among these variables to reach to an optimum level wherein dividends are paid to investors, firms make new investments for growth and able to maintain its cost of capital at optimum level. Firms in the long run aim at growth with optimal capital structure. In this context firms can't afford to:

- 1) forego or ignore profitable investment opportunities
- 2) operate with sub optimal capital structure
- 3) finance dividends by issuing new financial instruments thereby creating further liabilities

According to Residual Theory of dividends, the investors are paid dividends from the free cash flows remaining after funding of all profitable investment opportunities viz. the investments which are going to yield positive NPVs.

The dividends under this theory would be earnings left over after financing all acceptable investment opportunities. The minimum dividend can be zero and the maximum dividend will be determined by the firm's free cash flows.

This implies that there would be fluctuations in dividend payout ratio. When investment opportunities are in abundance the payout ratio is going to be zero and when there exists no profitable investment opportunity payout ratio is going to be 1.

Value maximizing firms may follow a modified residual dividend policy, wherein firms consistently pay dividends in excess of cash flows remaining after investment in new profitable projects. This dividend over and above the remaining cash flows is financed through external financing thereby inducing monitoring by market participants.

One of the natural outcome of residual dividend policy is fluctuating dividends, which are not appreciated by investors and market participants. Firms may smooth out dividends by retaining some funds in the surplus years and paying the same in the deficit years.

Analyzing the signals generated from residual dividend policy in conjugation with dividend signaling hypothesis will require unconventional approach. Investors investing in firms following residual dividend policy will interpret increase in dividends as negative signal as for these firms increase dividends signal lack of investment opportunities whereas decrease in dividends is a positive signal indicating plenty of investment opportunities.

Firms following residual dividend policy use the below mentioned process to determine the rate of dividend payout.

- 1) Estimate and determine the amount of capital expenditure required for the next year.
- 2) Estimate the amount of equity component required to execute capital expenditure in line with the capital structure of the firm.
- 3) Use the earnings to supplement the equity required for capital expenditure/expansion.
- 4) Pay the dividends if at least the equity component required for capital expenditure is covered by retained earnings.

In order to apply these steps one has to keep in mind the capital structure of the firm also. Suppose a firm maintains a debt to equity ratio of 1:1 and it has capital requirement of Rs.100 crores for future capital expenditure and has earnings of Rs.100 crores. Now in order to maintain the debt equity ratio of 1:1 even after capital expenditure the firm would use 50 crores of earnings and raise 50 crores from external sources in form of debt.

The formula to determine dividend under Residual Dividend Theory is:

Dividend = Net Income - Earnings required to finance new investment

Or

When capital structure is to be taken into consideration

Dividend = Net Income × (target equity ratio) × total capital budget

In order to understand this let us go through this example to determine dividend as per residual policy.

### Example 15.3

A firm is contemplating to invest Rs.200 crore in capital expenditure. The optimal capital structure of the firm is 30% debt and 70% equity. The firm has earnings of Rs.240 crore. Determine the amount of dividend payable using residual approach.

#### Solution:

Using the pure residual approach the firm can pay Rs.40 crore as dividend viz. Earnings-capital expenditure (Rs.240 crore- Rs.200 crore)=Rs.40 crore

But if we have take into consideration the capital structure also than this calculation would be different

Equity component required for capital expenditure=  $Rs.200 \times .7 = Rs.140$  crore

Amount for dividend payout=  $Rs.240$  cr-Rs.140cr= Rs. 100 crore

Now let us discuss how the investment opportunities are accepted or rejected. The basic principle governing any new investment is that the new investment will continue till the marginal returns from the new investment equal the marginal cost of capital.

The amount of earnings to be used by the firm for new investment is contingent upon expected returns on the available investment opportunities. If the marginal cost of capital is less than expected returns the new investments will continue till marginal cost of capital equals expected return. Vice versa if the expected return is less than marginal cost of capital the firm will not go for capital expansion and distribute the entire earnings as dividends. This position is shown graphically in fig 15.1

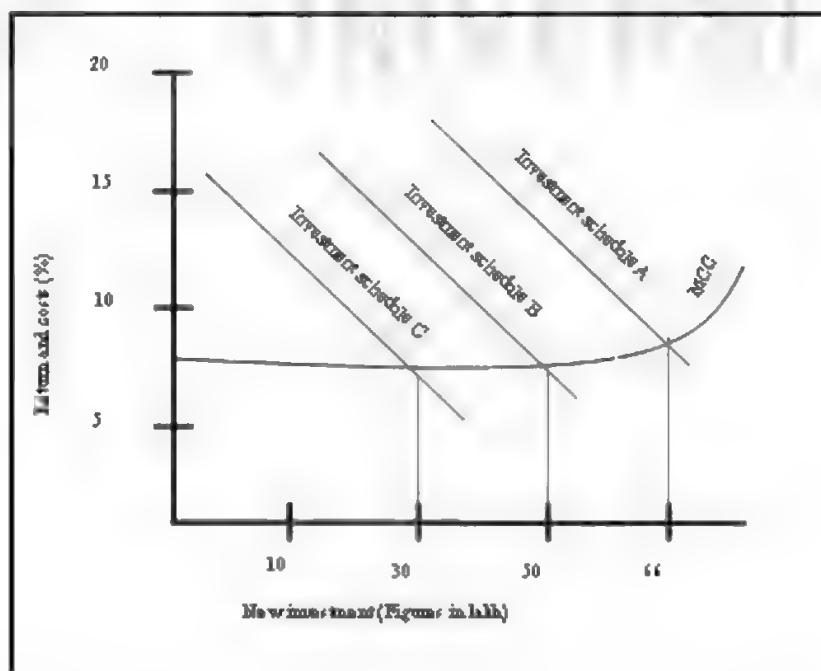


Fig 15.1 Relationship between new investments and Returns and Cost

Investment schedule 'A' depicts that firm can invest up to Rs.66 lakhs from retained earnings as up to this point marginal cost of capital is less than or equal to the expected returns. Schedule 'B' depicts that the firm will be able to invest up to Rs.50 lakhs before the marginal cost begins to exceed the expected return. Schedule 'C' depicts far less investment opportunities.

## 15.10 LET US SUM UP

Dividends are often used as measure of wealth creation and distribution for firm's. The objective of the distribution of dividends is to maximize the value of the firms as measured by the market price of the firms share. This proposition that dividend add value to the firm is keenly contested proposition. Miller and Modigliani have argued in their dividend irrelevance hypothesis that the value of the firm is decided by the earnings of the firm and the risk associated with the earnings. Dividend policy merely apportion these earnings between retained earnings and dividends and this has no bearing on the value of the firm, therefore dividend policy is of no relevance or irrelevant. However the M&M hypothesis is based on very restrictive assumptions and when these assumptions are relaxed and factored in to reflect the reality the dividend policy appears to be relevant.

## 15.11 KEY WORDS

**Clientale Effect:** It is a change in share price due to corporate action.

**Signalling Hypothesis:** A change in the share price as a result of some announcement.

**Information Asymmetry:** When there is a gap between shareholders and management about the information available.

**Dividend Clientale Effect:** Tendency of the investors to be attracted to certain type of dividend paying stock which affect the price of the stock when policies or circumstances change.

## 15.12 SELF-ASSESSMENT QUESTIONS

- 1) Do you agree with the proposition that dividends are irrelevant?
- 2) What is the Modigliani Miller irrelevance hypothesis? Critically evaluate its assumptions.
- 3) The assumptions underlying the MM hypothesis are unrealistic. Explain and illustrate.
- 4) What is the informational content of dividend payments? How does it affect the share value?
- 5) Explain the relationship between taxes and dividend policy.
- 6) Explain the Residual Theory of Dividend.

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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# **UNIT 16 DIVIDEND POLICY DECISIONS**

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## **Structure**

- 16.0 Objectives
- 16.1 Introduction
- 16.2 Objectives of Dividend Policy
- 16.3 Practical Considerations in Dividend Policy
- 16.4 Stability of Dividends
- 16.5 Dividends a Residual Payment
- 16.6 Corporate Dividend Behaviour
- 16.7 Forms of Dividends
  - 16.7.1 Cash Dividend
  - 16.7.2 Bonus Issue
  - 16.7.3 Dividend Reinvestment Plans
  - 16.7.4 Buyback of Shares
- 16.8 Let Us Sum Up
- 16.9 Key Words
- 16.10 Self-Assessment Questions

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## **16.0 OBJECTIVES**

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After studying this unit you, should be able to:

- understand the objectives of the dividend policy;
- analyze the factors influencing dividend policy;
- understand the concept of stability of dividends;
- explain and analyze the concept of treating dividend as residual payment;
- empirically analyze the corporate dividend behaviour; and
- discuss the ways in which companies distribute cash to shareholders.

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## **16.1 INTRODUCTION**

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In the previous units of this block we had discussed the theoretical views regarding the impact of dividends on firm's value. These theoretical views range from relevance to irrelevance of dividends; keeping in view the imperfect market conditions in which firms operate in real world the dividend policy cannot be treated as irrelevant either for the firm or the share holders.

The one extreme of these views is that dividends increase the firm's value and the other extreme is that the dividends are of no relevance to either the

shareholders or firms. Between these two extreme views are some moderate views which have evolved after taking into consideration the real conditions in which the firms operate. Some prominent explanations are tax effect hypothesis and asymmetric information and agency cost hypothesis.

In fact most of the companies accord a great deal of importance to the dividend decisions

## **16.2 OBJECTIVES OF DIVIDEND POLICY**

In normal course of business firms earn profits and reinvest a part of profit in new investments which results into future growth. At the same time share holders who have invested in firm require a return on their investment in form of dividends. Thus the dividend policy of the firm addresses and reconcile these competitive and conflicting demands.

Dividend policy decides on what quantum of earnings is to be retained for investments and what quantum of earnings is to be distributed to share holders as dividends. When a firm has no present and future investment plans the dividend policy can be very simple; whatever is earned by the firm is distributed it to the share holders. However in real world the decisions are not that simple. Retained earnings is a source of funds to finance the firm's long term growth along with external sources of finance. Raising funds through external sources involve further cost in the form of flotation cost and under pricing. Since the dividends are paid in cash they may impact the liquidity position of the firm. The dividend policy of a firm has its impact on both the share holders wealth and firm's long term financing. The firm's dividend policy is shaped by the following two factors.

### **Firm's Need for Funds**

When dividend decision is dependent on the financing decision of the firm the net earnings are considered as a source of long term funds. Under this condition dividends will be paid only when the firm has no potential profitable investment opportunity generating positive NPV at present or in foreseeable future. Firms will not pay any dividend when it invests in profitable projects from retained earnings. To finance new investments firms can either use retained earnings or raise funds from external sources but raising funds from external sources entails additional cost in the form of flotation cost and under pricing. If dividend distribution tax is borne by the companies on distributed dividends than by not distributing dividends the companies would have more funds to invest than what share holders can invest if they receive dividends.

How do firms grow over a period of time? They invest in projects where the rate of return is higher than their cost of capital. Now how do they meet the requirement of funds? Either they may retain profits or distribute profits and simultaneously raise funds from external sources. This implies that distribution of dividends cause reduction in quantum of internal funds available for investment; this may either constraint growth of firms or force the firm to look for external sources of finance which may be costly. The

approach of paying dividends only after exhausting all profitable investment opportunities is known as residual decision, more of this will be discussion latter in the unit.

### **Shareholder's need for income**

Shareholders of a firm are not a homogenous group, their expectations and need for current income in form of dividends varies wildly. The shareholders may consist of retail investors, big investors, institutional investors comprising of banks, insurance companies, pension funds, mutual funds, foreign institutional investors (FIIS), trusts and retired persons.

In practice the capital markets are not perfect and the shareholders are not indifferent between dividends and capital gains. Another aspect which is to be kept in consideration from shareholders perspective is the uncertainty associated with future earnings and consequently dividends. In view of uncertainty shareholders may prefer current dividends to higher future dividends or capital gains. Due to this perception share price of the firms paying high present dividends will command higher price as compared to the share price of firms paying low dividends. In nutshell investors having preference for current income and whose income tax liability is not adversely impacted by dividends will be willing to pay a premium for shares that offer regular dividends. On the other hand the market also consist of investors especially high net worth individuals who prefer capital gains over dividends. The reason being that the dividends are generally taxed at higher rates than the income from capital gains.

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## **16.3 PRACTICAL CONSIDERATIONS IN DIVIDEND POLICY**

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The conclusion that dividends are irrelevant is based on certain set of the simplistic assumptions; but when these assumptions are relaxed to incorporate the realities we come across a situation where the dividend policy of a firm does have a relevance and do have an impact on all the stakeholders. In practice all companies do follow some kind of dividend policy. In India most of the companies retain up to one third to one half of their income and distribute the rest as dividends. In India companies specify dividends in term of dividend rate which is a percentage of the paid up capital per share. Example: Suppose a company XYZ had issued shares of Rs. 10 face value at a premium of Rs. 150. All the shares are full paid up. Next year company announces a dividend of 100%. What is the amount of dividend will it be Rs. 160 or 10. Since the dividend rate is percentage of the paid up capital per share and in this case the paid up capital is Rs. 10 therefore the amount of dividend would be Rs. 10.

The firm while designing its dividend policy, keep in consideration the following factors.

- 1) Firms financial needs in context of its growth plan and investment opportunities.

- 2) The composition of shareholders and their expectations regarding dividends.
- 3) Firms business and Financial risks.
- 4) Legal and Financial constraints in paying dividends.
- 5) Control considerations viz. is the firm a target of takeover or acquisition.
- 6) Firms dividend policy;
- 7) Form of dividend whether in the form of cash dividend, bonus shares or shares buyback.

Now let us discuss each of these factors in some detail.

**1) Firms Investment opportunities and Financial needs:**

Just as product life cycle firms also go through various phase of life cycle starting from growth to maturity to decline. During the different phases of firm's life cycle the firm has different investment opportunities and financial needs and the dividend policy is shaped in accordance with these needs and opportunities. During the growth phase the firm require funds for capital investment to create additional capacity to cater to growing demand. Consequently the firms would distribute less of the earnings in the form of dividends and would have lower payout ratio. Growth companies issue bonus share from time to time in order to satisfy the dividend need of the shareholders. As growth firms mature they tend to slowly increase the dividends as profitable investment opportunities dwindle. In case of mature firms the investment opportunities are lower and infrequent. Consequently the mature firms distribute most of the earnings, only retaining a small portion to meet any emergent financial needs or to finance occasional investment opportunities.

Since the mature firms do not have sufficient profitable investment opportunities the retained earnings are invested in short term securities yielding nominal returns. In some cases mature firms may follow the policy of paying 100% of earnings as dividends and they may raise funds from external sources in case the need arise.

In case of declining firms the dividends distributed may be more than the earnings of the firms as in these firms the cost of capital is higher than the rate of return required by the shareholders. Therefore in declining firms, firms may not only distributes the whole of earnings but also a part of the capital to the shareholders.

Firms should design their investment policies in such a fashion so that the long term investment requirements, of the firms are meet at minimum cost. Dividend policy shall endeavor to have maximum financial flexibility. Firms having financial flexibility can discharge their debt obligations, and invest in research and development of new products and services.

## 2) Shareholders expectations:

In case of widely held companies (companies having large number of shareholders) shareholders are diverse and heterogeneous groups, each having their own expectations regarding dividends. These expectations manifest themselves in preference for either current income (dividends) or future gains (capital gains). These expectations and preferences are shaped by the economic status of the shareholders and the tax differential between income on dividends and capital gains. For instance in India the dividends are taxed at the rate in which the income of the receivers of dividend falls viz. if they are in 30% income tax bracket dividends will be taxed at the rate of 30%. Whereas capital gains related to sale of equity shares is taxed at 10% irrespective of the tax bracket in which shareholder is. So in order to maximize after tax returns usually shareholders would have preference for capital gains rather than dividends. Whereas shareholders who are not taxable or are in the lowest tax bracket would prefer dividends.

Board of directors has discretion regarding the quantum of dividends to be declared but at the same time they are also agents of the shareholder who are legal owners of the company, and they should keep the expectations of the shareholders while deciding on dividends. The board of directors will have to strike a fine balance to reconcile the expectations of various groups. They can do so by a two pronged strategy wherein they give some consideration to the expectations of each of the group comprising a substantial proportion of shareholders. Secondly they should continue with the already established dividend policy of the firm unless the investment requirements require the firm to retain more earnings. The advantage of the second course of action is that a stable and consistent dividend policy will attract those investors whose interest and expectations all aligned with the dividend policy of the firm. This process is also known as ‘clientele effect’.

Now if the dividend policy is suddenly changed for whatsoever reasons the expectations of this clientele will be misaligned and they may shift to another firms. Thus whenever an established dividend policy is required to be changed it should be changed gradually and the probable effect of change or shareholders shall be analyzed beforehand.

## 3) Firms business and financial risks:

Business risk is the uncertainty associated with expected future earnings. This risk is a combination of the sales risk and operating risk. Sales risk is the uncertainty associated with future sales which comprises of price and quantity of goods and services of the firm. The operating risk is the risk associated with firm's operating cost structure. The financial risk refers to the probability of not honoring the financial commitments due to inadequate cash flows. The financial risk arises due to use of debt to finance operations and less related to business risk.

Therefore the firms facing higher degree of business and financial risk shall conserve cash instead of paying dividends, whereas the firms having adequate and assured cash flows can think of paying dividends.

One of the factors that impact the design of the dividend policy is the firm's business and financial risk.

**4) Constraints in paying dividends:**

Most of the firms would like to share their profits with the shareholders in form of dividends, but they may be constrained in doing so due to the following factors:

**i) Legal restrictions**

Legal framework governing dividends is evolving continuously. Prior to the enactment of companies act 2013 companies were required to transfer a certain percentage of profits to the reserves before declaration of dividends. However this requirement has been done away in the companies act 2013. Similarly the provisions related to taxation of dividend income are also evolving. In year 1997 Dividend Distribution Tax was introduced and companies had to pay a certain amount of tax on dividends distributed by them and the dividend income in the hands of shareholders was tax exempt, however this provision of taxation has also been withdrawn and now the companies do not have to pay tax on dividend distribution and dividends are taxed in the hands of shareholders.

**ii) Liquidity and working capital consideration**

Payment of dividend results into cash outflow thereby impacting the firm's liquidity. A firm may be profitable but may not have enough cash to pay dividends. This position may arise when bulk of sales is on credit and bulk of purchases is in cash or too much of funds are tied up in the working capitals. The overall liquidity position of the firm plays an important role in determining the quantum and timing of dividend payments. Mature firms with stable sales will have higher liquidity as compared to growth firms which continuously require funds to finance increasing working capital requirements. From this it can be inferred that mature firms will follow a liberal dividend policy, whereas growth firms may follow conservative policy.

Another aspect related to liquidity is the management of working capital. The payment of dividend reduces the cash available with the firm. This reduces the current assets and consequently the working capital. In case the firm follows a already established dividend policy and on distribution of dividend if the firm faces cash shortage, the problem which needs to be resolved is to whether the preservation of already established dividend policy warrants impairing liquidity of the firm or even borrow funds from external sources to pay the dividends. These conflicting requirements viz. payment of regular dividends or preservation of liquidity needs to be resolved based on the prevailing market and economic condition.

Adequate working capital is required for continuous and sustainable operations of the firm. Working capital reduction resulting from payment of dividends is not a desirable course of action. A firm with

dwindling working capital condition if opts to pay dividend as per its previously established dividend policy may also face higher cost of capital as creditors and debt investors will raise the price of their funds due to higher risk poised by lower liquidity.

**iii) Financial condition and borrowing capacity and Future Financing :**

The financial condition of the firm is often judged by the amount of debt on firms balance sheet and it ability to pay the principle amount and interest thereon. A high degree of financial leverage (more debt as compared to equity) in firms capital structure will make it vulnerable to changes in earnings and interest rates. A firm with high degree of financial leverage will face difficulty in raising finance from external source and even if it is able to raise funds from external sources they would be at higher cost. In view of these facts a highly levered firm shall retain more of its earnings to strengthen its equity base.

The firms which are highly levered but have consistently growing cash flows earning and are without much investment opportunities may follow a high dividend payout policy in spite of having high amount of debt in its capital structure. This policy will favour shareholders only if the cost of debt is less than the returns generated by the firm.

A growing firm may choose to pay dividends by borrowing from external sources in absence of adequate cash flow and liquidity; but this course of action is seldom followed as it may imperil the financial flexibility of the firm. Financial flexibility includes the ability of the firm to raise capital from external sources at the most competitive rates at the time of its choosing.

A firm planning to raise funds from external sources to finance part of its future growth will have to factor in dividend policy for all its financial policies in future. Theoretically no precise relationship has been found between dividend policy and firms ability to raise funds from external sources, but is generally accepted that firms with good track record on dividend find greater acceptability for both their new equity issues and debt issues. The firms which distributes all or a substantial part of its earnings as dividends will find it difficult to raise funds from external sources due to its low risk bearing capacity which results from its low equity base. Low equity base is the consequence of dividend policy under which all the earnings are distributed as dividends.

**iv) Inflation**

Inflation or rise in prices has a bearing on the dividends. In our accounting system depreciation is charged on the historical cost of the depreciable assets. Depreciation is charged so that an amount equal to the asset value is accumulated to replace an asset which falls into disuse after its economic life is over. As a result of

inflation the price of the assets will rise and the funds accumulated in the depreciation account will not be sufficient to buy a new asset or maintain capital assets intact. So due to inflation the firms may be constrained to pay dividend or maintain the same dividend rates which they follow during normal inflation period. One possible solution to this problem is to increase the retention percentage at the cost of dividend payout ratio.

v) **Business Cycle Considerations**

Many of the companies offer products and services whose price and demand depends on the phase of the business cycle. This results in variation in profits during the various phases of business cycle. During the upswing in the business cycle firms may reap super normal profits and during downswing they may earn normal profits or even incur losses. The implication of this for dividend policy is that during the boom period the firm shall retain more of the earnings so that the same can be used to offset the temporary decline in profits and smoothen the dividends during downswing or recession.

The smoothening of dividends over the business cycle is just not only a dividend policy decision but also a financial management technique. For example during an upswing working capital requirement increase which is financed from earnings at the cost of dividends; the dividends are not increased in the proportion of earnings. On the other hand during downswing working capital requirement decreases and additional funds are available by scaling down of operations and liquidating of inventories due to this even during downswings excess funds would be available to the firm even after paying of dividends in proportion of profit.

vi) **Control**

The dividend policy in conjunction with the investment policy has a potential to attract new investors to the firm who can eventually take the control of the firm from the existing management. The firms which have large amount of retained earnings in the form of cash or cash equivalents or underpriced assets in the balance sheet are active targets for acquisitions and takeovers when the share prices are low due to non deployment of retained earnings in profitable projects. The other way round is that when firm declares large dividends the firm cash position is affected and to make new investments the firm will have to issue new shares. The control of the existing shareholders may be diluted if they do not subscribe to the new shares in the proportion of their existing holdings. Therefore a tight as well as liberal dividend policy has control implications. The existing management as per its financial strength should design the dividend policy so as not to cede control to competitors or new entrants.

## 16.4 STABILITY OF DIVIDENDS

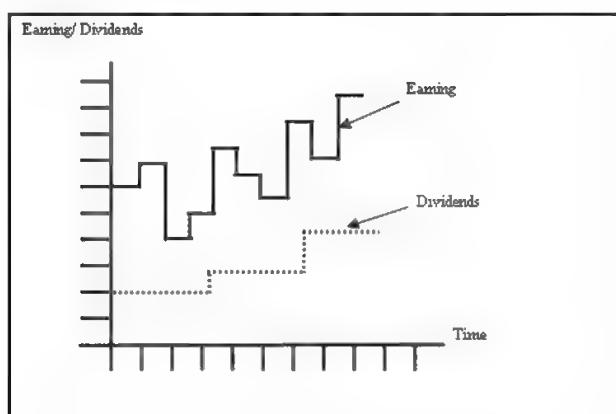
While deciding on the firm's dividend policy the firm has to take into consideration two important dimensions of dividend policy viz. what should be the average payout ratio and how stable the dividends should be over time? Most companies try to maintain a stable dividend policy over time as most of the shareholders prefer stable dividends and in the long run firms paying stable dividends will trade at a premium to their peer firms whose dividends are fluctuating. Irrespective of the long run payout ratio followed by the firm, three forms of dividend stability can be distinguished, which are as follows:

- Constant dividend per share or stable dividends or steadily changing dividends.
- Constant payout or stable dividend payout ratio
- Constant dividend per share plus extra dividend

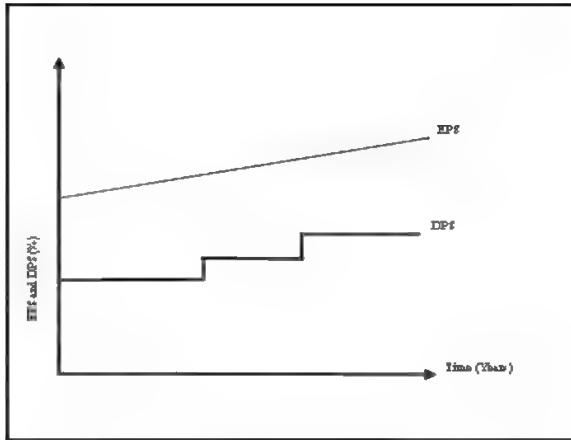
### **Constant Dividend Per share:**

In India companies declare dividends as per cent of the paid up capital per share and not as per cent of earnings. Suppose the paid up capital per share of the company is Rs. 10 and earnings per share (EPS) is Rs. 20 and company declares the dividend at the rate of 30%. The amount of dividend would be Rs. 6 or Rs. 3? As per the convention which we follow in India the amount would be Rs. 3 which is 30% of Rs. 10, and if it is interpreted in terms of EPS, it would be Rs.6.

When a company follows a policy of paying a fixed rate on paid up capital as dividend every year irrespective of the fluctuations in earnings it results into stable stream of dividends over a period of time. You may think that under this policy dividend would remain constant forever, but this is not the case. When the company attains higher level of earnings and expects to maintain the new higher level of earnings in future it may increase the rate of dividend on paid up capital. The relationship between earnings and dividend under this policy is shown in figure 16.1 and 16.2.



**Fig. 16.1: Stable Dividends or Steadily Changing Dividends**



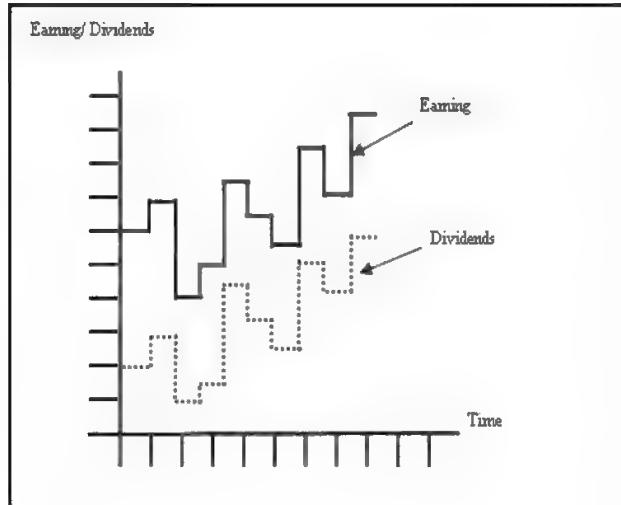
**Fig 16.2 Constant Dividend Per Share Policy**

This policy is easily to implement for those companies whose earnings are stable and do not exhibit much fluctuations over a period of time. However for companies exhibiting wide fluctuations in earnings this policy would be difficult to implement. Companies which wish to pursue this policy of dividend distribution shall transfer the surpluses of higher than average earnings years to dividend equalization reserve in order to maintain dividends in years of below average earnings. The surplus funds transferred to dividend equalization reserves are usually invested in liquid assets like marketable securities so that they can be easily converted into cash for the purpose of paying dividends in years of below average earnings. This kind of dividend policy effectively puts ordinary shareholders at par with preference shareholders. This type of dividend policy will attract those clientless who have only dividends as their source of income. This type of clientele does not accord much importance to capital gains arising out of increase in share price. These kinds of policy will also stabilize the share price in the long run.

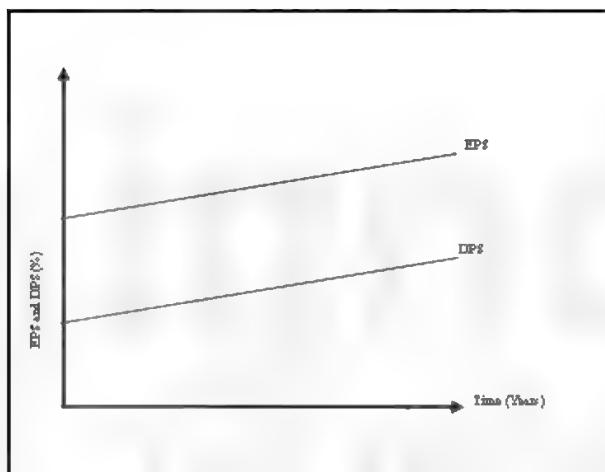
#### **Constant Payout or stable Dividend Payout Ratio:**

The ratio of dividend to earnings is known as Payout Ratio when companies pay a fixed percentage of earnings as dividends every year this kind of dividend policy is known as constant payout policy. Under this policy percentage of earnings paid out as dividend remains constant. The natural outcome of this kind of policy is fluctuation in dividends over a period of time and transmission of variability in earnings to dividends. Under this policy dividends will fluctuate in direct proportion to earnings. Suppose a company adopts a payout ratio of 30% and the company's earnings per share (EPS) is Rs. 10, then the dividend would be Rs 3 per share. Now in the next year company's EPS is Rs. 5 then the dividend would be Rs 1.50. In the subsequent year company's EPS is Rs. 20 then the dividend would be Rs. 6 per share. You can very well gauge the wide fluctuation in dividends as a result of fluctuation in earnings.

The relationship between the Earning per share and the Dividend per share is shown in fig 16.3 and 16.4.



**16.3 Stable Dividend Payout Ratio**



**Fig 16.4 Dividend Policy of Constant Payout Ratio**

This policy can be followed only when the company is making profit, in case the company is incurring losses no dividend will be paid. The advantage of this kind of policy is that the internal financing for additional capital investment is automatic. For any given payout ratio the dividend and retained earnings grows with increased earnings and decreases with lower earnings. This policy also takes care of the liquidity position of the company to some extent as dividends is always paid out of profit and in case of reduce earnings lesser dividend is paid.

#### **Constant Dividend per Share plus Extra Dividends:**

Growth firms and firms requiring huge capital investments depends up to a large extent on internal financing but at the same time they have to raise funds from external sources. These types of firms have fluctuating earnings. For these kinds of firms dividend payment serve two important objectives one is to satisfy the expectation of existing shareholder and second is to signal to external sources about the firm's ability to meet its financial commitments.

These type of firms design their dividend policy in which a small sum is always paid as dividend and when the capital investments starts yielding

positive cash flows extra dividend in the form of interim dividend is paid to the shareholder. In India number of companies pays interim dividends during the financial year followed by final dividend after the end of financial year. Now the question which we need to answer is that why do companies not pay a larger amount of final dividend at the end of the financial year.

The price of any asset (in this case firm's share) is determined by the expected cash flow from that asset. By paying interim dividend the firm signals to the investor that the increased earnings at this point of time is transient (not permanent) in nature and the investors shall not expect that increased dividend amount (interim dividend) represents an increase in the established dividend amount.

This kind of dividend policy provides flexibility to the company to pay constant dividend regularly without a default and simultaneously supplement the income of shareholders without raising the expectations of increased dividends in future.

### **Rationale for Dividend Stability:**

Most of the firms follow a dividend policy that results into stable dividends or gradually rising dividends and as far as possible they avoid unexpected increase or decrease in dividends. The stable dividend policy has several advantages which are as follows:

- Signaling and resolution of investors' uncertainty
  - Investors' desire for current income
  - Institutional investors' requirement
  - Ease in raising additional resources
- i) Signaling and resolution of investors' uncertainty dividend have informational value and is used as signaling method to convey the prospects of future earnings of the firm. The informational content and signaling in conjunction resolves uncertainty and modify the perception of investors at large. When the earnings of the firm falls and it continues to pay the same amount of dividend as in the past; it is a clear signal to the investors that the blip in earnings is transitory and the firm will tide over the situation in the near future. Similarly increase in dividends as a result of increase in earnings is suggestive of the fact that the firm would be able to sustain the increased earnings.

If the firm varies dividend widely due to cyclical changes in earnings or due to presence of certain transient influences, the dividend decision would lack the uncertainty resolving power. Hence even if the situation demand for change in dividend rate / policy in response to certain change in the long term prospects, the same should be operationalised gradually giving enough signals to the shareholders regarding the graded response to the changed prospects.

- ii) Investors' desire for current income: As discussed in earlier unit's investors have desire for current income and there exists a specific clientele who invest in shares of a particular company with an

expectation of receiving regular income in form of dividend. For them dividends is a source of income to meet their living expenses. Dividends are akin to wages and salary for them. Since the objective of these investors is to receive dividends rather than capital gains they would prefer companies having a track record of paying stable dividends rather than those companies paying fluctuating dividends.

- iii) Institutional investors' requirement: Institutional investors are significant investors in the equity markets with the opening up of economy and relaxation in the threshold level up to which foreign institutional investors can buy equity in any company, the significance of institutional investors has considerably increased. Since they are long term investors every company would like them to invest in their company as they provide stability to share price. Institutional investors generally prefer to invest in those companies which have a track record of paying of stable and regular dividends.

## **16.5 DIVIDENDS AS A RESIDUAL PAYMENT**

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Dividend decisions are not taken in isolation; they are depended on many variables which may be internal or external to the firms. While deciding on dividend decision the firm shall look and analyze the following consideration.

- 1) Value creation potential of the firms is contingent on investment decisions which in turn is dependent to some extent on dividend decisions
- 2) External finance is difficult to raise and is generally more expensive than the internal finance (retained earnings) because of issue cost, compliance cost and under pricing.
- 3) Raising funds through additional equity finance will reduce the proportionate holding of promoters leading to loss of control of promoters on the firm.
- 4) Beyond a certain point the firm may find it difficult to raise finance through debt issuance. A higher amount of debt in the capital structure would raise the cost of capital and any incremental debt financing would entail higher cost.
- 5) The dividend decision is an important communication tool through which management conveys the future prospect of the firm not only to the shareholders but also to other stakeholders.

If the above mentioned points are kept in consideration, the dividend and investment policy that emerges will have following features:

- 1) Positive NPV projects shall be given first preference over the payment of dividends.
- 2) Minimise the need for external equity finance.
- 3) Define a target dividend payout ratio along with the target debt equity ratio taking into consideration investment needs and tax structure.

- 4) To bring flexibility in operations allow temporary departure from target dividend payout ratio and debt equity ratio
- 5) As far as possible avoid dividend cuts

When the firm finances its equity component of investments from earnings the question which managers has to decide is, about the quantum of equity earning to be earmarked as equity finance required for supporting future investments.

When dividend is treated as residual payment the equity earnings of the firm are first used to provide equity finance for future investments and surplus if any left is paid as dividends. As per this approach the dividends are merely treated as a residual payment of surpluses left after financing of equity finance for new projects. In order to understand this, suppose a firm has debt equity ratio of 2:1 and has earnings of Rs. 150 crores. Its requirement for new investment is Rs. 150 crores. Now if the firm follows a dividend policy where dividend decision is treated as residual payment then what would be the amount of dividend distributed by the firm.

Now since the debt equity ratio of the firm is 2:1 any new investment would be financed in the same proportion, 2 parts from debt and one part from equity. In this case investment of Rs. 150 crores would be partly financed from debt of Rs. 100 crore and partly from equity earnings of Rs. 50 crore. The surplus of Rs. 100 crore would be available for distribution as dividend.

Firms following residual dividend policy can adopt one of the following approaches.

- i) Pure residual dividend payout ratio approach
- ii) Fixed dividend payout ratio approach and
- iii) Smoothed residual dividend approach

In order to understand each of the approaches, let us first go through the following variables related to earnings and dividends

$E_t$  = earnings in year t

$I_t$  = equity support required for financing the investment in year t (equity investment component)

$D_t$  = Dividend paid in year t

$P_t$  = Dividend payout ratio for year t =  $(D_t/E_t)$

Here the variable  $I_t$  require some further explanation. When the firm goes for new investment the investment is partly financed by retained earnings (equity) and partly by debt. This is done in such a way that the existing capital structure is not disturbed. Thus the firm earnings may be sufficient to finance the new investments but keeping in mind the target capital structure only a part of earnings would be used to finance new investment. This part  $I_t$  is the equity support required for financing the investment in year t. Now let us briefly discuss the following approaches:

And understand how dividend is calculated in each.

i) **Pure Residual Dividend Approach :**

According to this approach, the dividend paid in year  $t$ , which is  $D_t$  would be calculated as follows

$$\text{If } I_t > E_t \quad D_t = 0 \quad (16.1)$$

$$\text{If } I_t < E_t \quad D_t = E_t - I_t \quad (16.2)$$

Put simply if the equity investment component is greater than the earnings of the firm then the resulting dividend would be nil and if the equity investment component is less than the earnings than the dividends would be the difference between earnings and equity investment component.

ii) **Fixed Dividend Payout Ratio Approach:**

According to this approach a constant proportion of earnings are paid as dividend every year. This constant proportion  $P_t$  is set in such a way that in the long run quantum of dividends is equal to equity earnings minus equity finance required for new investment. Dividend under this approach is determined as

$$D_t = P_t \times E_t \quad 16.3$$

and the quantum of dividends in the long term is

$$\sum_{t=1}^n D_t = \sum_{t=1}^n E_t - \sum_{t=1}^n I_t$$

iii) **Smoothed Residual Dividend Approach:**

According to this approach the dividends are varied gradually over a period of time in such a way that the total dividends paid in that period of time equals to total earnings less equity finance required to finance new investments.

**Table 16.1: Dividend Streams under Different Policies**

		1	2	3	4	5	6	Total
A	Earnings	200	225	282	253	290	300	1550
B	Investment Budget	182	190	300	190	230	250	
C	Equity Component Of Investment	91	95	150	95	115	125	
D	Pure Residual Dividend(A-C)	109	130	132	158	175	175	879
E	Fixed Dividend Payout ratio $P_t = .567$	113.4	127.575	159.9	143.45	164.43	170.1	879
F	Smoothed residual Dividend	120	130	140	150	160	179	879

Table 16.1 shows the dividends for a period of six years under each of the above policies. You may observe that the pure residual dividend policy generates fluctuating dividend stream, the reason being the transmission of variability in earnings and investment budget to the dividends. Similarly under the fixed dividend payout ratio dividend generated are fluctuating because of transmission of variability in earnings to dividends. The smooth residual dividend policy generates a stable and steadily growing return. Since the investors are averse to fluctuating dividends therefore as far as possible pure residual dividend policy and fixed dividend payout ratio policy should be avoided. The smoothed residual dividend policy is the sensible approach to follow in practice while designing dividend policy.

## 16.6 CORPORATE DIVIDEND BEHAVIOUR

Until now we have discussed the theoretical basis, which dictates the management's dividend behavior. How does the corporate dividends actually behave in the real world was analyzed by John Linter in 1956 and his survey revealed the following facts about the corporate dividend behavior.

- 1) Firms have long term target payout ratio and they gradually aim to attain the same.
- 2) Management is more sensitive towards the changes in dividend rate rather than the absolute amount of dividend paid.
- 3) Dividends are a function of earnings and they tend to follow earnings, but change of dividend in context of earnings is a smooth process implying that dividend changes gradually in response to change in earnings.
- 4) Dividends are sticky in nature. The managers are reluctant to change dividend with change in earnings because the market may take an adverse view when these changes are reversed corresponding to decline in earnings.

Linter's conclusions were based on the model which he had developed which is as follows:

$$D_t = c \times r \times EPS_t + (1-c) D_{t-1} \quad (16.5)$$

Where

$D_t$  = dividend per share for year t

c = adjustment rate

r = target payout rate

$EPS_t$  = earnings per share for year t

$D_{t-1}$  = dividend per share for year t-1

To understand how this model operates it we go through the following example.

### Illustration 1:

ABC Ltd. has earnings per share of Rs. 8 for year t. Its dividend per share for year t-1 (previous year) was Rs. 3. Assume that the target payout ratio and adjustment rate for this firm are 0.8 and 0.5 respectively. What would be the dividend per share for ABC Ltd. for the current year if the Linter's model applies to it?

#### Solution:

Linter's model

$$\begin{aligned} D_t &= c \times r \times EPS_t + (1-c) D_{t-1} \\ D_t &= .5 \times .8 \times 8 + (1-.5) \times 3 \\ &= .5 \times 6.4 + .5 \times 3 \\ &= 3.20 + 1.50 \\ &= \text{Rs. } 4.70 \end{aligned}$$

ABC Ltd.'s dividend per share for year t would be Rs. 4.70

The Linter's model establishes relationship between the current EPS, target payout ratio and the past dividend. The current dividend depends partly on current EPS and the previous year dividend. Similarly the previous year dividend is a function of the earnings of that year and the dividend of the prior year, so on and so forth. As per the Linter's model dividends are weighted average of past earnings. From equation 16.5 we can obtain the following equation 16.6. This equation depicts the change in dividend from year t-1 to t

$$D_t - D_{t-1} = c (r EPS_{t-1} - D_{t-1}) \quad (16.6)$$

The change in dividend from previous year to current year  $D_t - D_{t-1}$  is equal to the product of adjustment factor c and the difference between the target dividend and the previous year dividend. The target dividend in this equation is  $r \times EPS_{t-1}$ . The term  $(r EPS_{t-1} - D_{t-1})$  is the difference between the targeted dividend and the actual dividend for the previous year. Multiplying this difference by adjustment factor c gives the difference between the dividend of this year and the previous year. For firms perusing liberal dividend policy the value of c is large when compared to the firms following conservative dividend policy. A conservative company will slowly reach towards its target payout ratio. The implication of equation 16.5 and 16.6 are

- i) Current year earnings are important factor in determining current year dividends
- ii) The change in dividend from previous period to next period does not correspond exactly with changes in earnings from one time period to another.

Linter's model can be also expressed in the form of the following regression equation.

$$D_t = a + b_1 \times EPS_t + b_2 \times Div_{t-1} + e_t$$

Where  $b_1 = cr$  and  $b_2 = (1-c)$

The term  $(1-c)$  is a safety factor that the firm's observe by not increasing the dividend to level, where it would be difficult to maintain.

## 16.7 FORMS OF DIVIDENDS

Firm's usually pay dividend in cash, but under certain circumstances they may opt to pay dividends in some other way in the form of bonus shares, share repurchase, and dividend reinvestment plans (DRIPS). In this section we are also going to discuss about stock split which is not exactly a form of dividend but has a similar effect to that of issue of bonus shares. Now let us briefly discuss each of these forms.

### 16.7.1 Cash Dividend

Firms pay dividend in cash as paying dividend in kind or others form is expressly prohibited under law. A Firm should have enough liquidity when dividend is declared. In case of absence of liquidity firm should borrow funds to meet its commitment of paying dividend after they are declared. In case of stable dividend policy pursued by firms, it is easy to make precise provisions for payment of dividend in the cash budget. The same is relatively difficult to make when firm pursues erratic or unstable dividend policy.

When cash dividend is paid the cash account and the reserve account will reduce. The total assets and the net worth of the firm are reduced when cash dividend is paid. Post payment of dividend or when the share becomes ex dividend the price of the share drop by the amount of the cash dividend distributed.

### 16.7.2 Bonus Shares

An issue of bonus share implies distribution of shares free of cost to existing shareholders in proportion of their existing holdings.

Suppose a firm started with Rs. 1000 cr. capital in the form of 100cr. Equity shares each priced at Rs. 10 at par. During the course of operations for next several years the firm has enjoyed a healthy growth in sales and profits. A small part of the profit was distributed as dividend and rest of the profits were ploughed back in the firms operation. As a result of this the earnings per share and the share price has increased. Now these shares have very high EPS and DPS. When a normal P/E ratio is applied for valuation it results in valuation where share prices are so high that very few investors are able to buy a lot of 100 shares. This situation results into limited demand for these shares there by keeping the firms market value below what it would have been if more shares with lower price would have been outstanding. To correct this situation management has two options viz. issue of bonus shares or to go for stock split. Now let us analyze the impact of each of these actions.

### Bonus Shares:

An issue of Bonus shares implies issuance of new shares free of cost to existing shareholder in proportion of their holdings. In India bonus shares are issued in addition to the cash dividend and bonus share can't be a substitute for cash dividend. The issuance of bonus shares increase the number of outstanding shares of the firm but there is no dilution in ownership as a result as additional shares are issued in proportion of current holdings. For example if the shareholders own 1000 shares and firm declares a bonus issue of 1:10. This implies that for every 10 shares held by the shareholder he will receive one additional share. In this case the shareholder is going to receive 100 additional shares and so do the other shareholders in the proportion of their holdings.

Bonus issue is recapitalization of reserves and surpluses. It is an accounting exercise in which fund are transferred from reserve and surplus account to paid up capital account. Bonus issue results in increase in paid up capital and reduced the reserves and surplus, but the total net worth of the firm is not affected at all. In order to understand this let us go through the following example.

### Illustration 2:

The following information is available for XYZ company. XYZ company declares a bonus issue of 1:10. At the time of declaration the market prices of its share was Rs. 90. The bonus shares are issued at market price at a premium of Rs. 80 over the par value of Rs. 10 per share. Prior to issue of bonus shares the equity portion of the balance sheet revealed the following:

	Rs. Cr
Paid up share capital (3 Crore shares at Rs. 10 per share)	30
Share premium	45
Reserves and surplus	30
Total net worth	105

A 1:10 bonus issue implies issuance of 30 lakh new shares to the existing shareholders. At price of Rs. 90 per share the total value of new shares issues would be  $30 \text{ lakhs} \times \text{Rs. } 90 = \text{Rs. } 27 \text{ crore}$ . This amount of Rs. 27 crore would be transferred to paid up share capital account and share premium account from the reserve and surpluses account. The paid up share capital account will increase by  $30 \text{ lakhs} \times \text{Rs. } 10 = \text{Rs. } 3 \text{ crore}$  and the share premium account by  $30 \text{ lakhs} \times \text{Rs. } 80 = \text{Rs. } 24 \text{ crores}$ . The new capitalization or equity portion of the balance sheet would be as

	Rs. Cr
Paid up share capital (3.3 Crore shares at Rs. 10 per share)	33
Share premium	69
Reserves and surplus	3
Total net worth	105

Now notice that the total new worth remains unchanged.

The consequences of bonus issue are:

- 1) The shareholders proportional holding remains unchanged.
- 2) The book value per share, earnings per share and the market price per share decreases but the increase in number of shares offset these decreases.

Advantages of Bonus shares:

As seen the issuance of bonus shares has no impact on the wealth of the investors and net worth of the company. However due to market imperfections and signaling potential the issuance of bonus share have some advantage for both investors and the company at large and shareholders.

### **16.7.3 Dividend Reinvestment Plans (DRIPs)**

Dividend Reinvestment Plans are schemes that enable shareholders to automatically reinvest the dividend received back into the shares of the firm paying dividends.

This kind of plan is not operational in India, but is quite popular in America and Europe. This plan gained popularity in the early 70's. Even today many multinational corporations offer these plans but the participation varies from company to company. There are basically two types of DRIPs.

- 1) Plans that involve already issued outstanding shares (old shares)
- 2) Plans that involve issuing new shares

Under both these plans the shareholder has choice to receive dividend or let the company use the dividend to buy the share of the firm for the investor. Under the 1<sup>st</sup> plan the firm transfers the dividend amount of shareholders opting for this plan to a bank and the bank in turn buys the shares from the open market and allot the same to the shareholders on prorata basis.

Under the 2<sup>nd</sup> plan the dividend amount of the shareholders opting for this plan is used to issue new shares to the shareholders in addition to the existing shares. In this plan no fees is charged from the shareholders and sometimes the new shares are even issued at a discount of 2 to 5% to the market price. This discount is saving of the company which it would have otherwise incurred as flotation cost. The major difference between plan 1 and 2 is that under plan 1 there is no increase in paid up capital of the firm whereas in plan 2 the paid up capital (equity component) increases.

### **16.7.4 Buyback of Shares**

Buyback of shares is the repurchase of a part of the outstanding shares of the company by the company itself. Till 1999 Indian companies were prohibited from buying their own shares but with amendments in the companies act the companies can now repurchase their own shares subject to the following conditions:

- 1) Company opting for buyback of shares will not issue fresh capital for next 12 months except for issuance of bonus shares.
- 2) Prior approval of the shareholders shall be obtained and the funds to be used for buyback shall be explicitly stated.
- 3) Buyback can only be done by utilizing free reserves viz. reserves not earmarked for any other purpose.
- 4) Companies are prohibited from using debt funds/borrowings to effect buyback.
- 5) The shares bought through buyback are to be extinguished and can't be reissued.

### Methods of share buyback

There are three major reasons why companies go for buyback of shares. The reason 2&3 stated below are not applicable in Indian context as use of debt is not permitted for buyback and shares are to be extinguished consequent to buyback.

- 1) Situation where companies are saddled with excess cash and they do not want to distribute it as dividend as higher dividend in one period generates signals of higher sustainable earnings in future. To avoid generating these types of false signals the company distributes cash by repurchasing shares rather than paying dividends.
- 2) Situation wherein the company is largely financed with equity capital resulting in very low debt to equity ratio leading to suboptimal capital structure. In this situation the company may issue debt securities and use the proceeds from it to repurchase its own shares.
- 3) When the company uses stock options as component of compensation (salary) structure of employees, than it uses open market repurchase to obtain shares for use when the options are exercised

Share repurchase is usually made in one of the following three ways:

- 1) **Open Market:** a company can buy back its shares from the open market through authorized brokers at the prevailing market price.
- 2) **Tender offer:** The company can make a tender offer in which it will specify the purchase price, the total amount of the tender offer and the period within which shares would be bought back. In case more shares are tendered than that stipulated in the tender offer the buy back is made on pro rata basis.
- 3) **Negotiated deal:** The company can buy a block of shares from a single shareholder or a group of shareholders at a negotiated price. When this route is applied for buyback the company should take care that one shareholder does not receive preferential treatment at the cost of other shareholders. This type of route is generally used to ward hostile takeover attempts by large shareholders and such payments are referred to as **greenmail**.

It is generally believed that share buyback is beneficial for the company, for the shareholders who have sold out and the remaining shareholders. As the shares bought under buyback route are to be extinguished, this would result into reduction of equity capital and the number of outstanding share. If after the buyback the company is able to maintain its operational efficiency the earnings per share will increase and PE ratio will increase or decrease depending upon how the market perceives the riskiness of the firm. The debt/equity ratio is going to increase and the companies with low debt to equity ratio may use share buyback to move to their target capital structure.

To understand the impact of share buyback let us go through the following example.

**Illustration 3:**

Xyz ltd. expects profit after tax (PAT) at Rs.440 crore in the current year. It plans to use half of it viz. 220cr to repurchase part of its outstanding shares ,which are 110 cr in number. The market price per share is Rs.20 per share. Show the effect of repurchase on the EPS and market price after repurchase.

**Solution:**

With a sum of Rs.220 cr company can buyback 11cr of outstanding shares, therefore after buyback the number of outstanding shares would be 99 cr.

- 1) Current EPS = $440/110$  =Rs. 4
- 2) Current PE ratio =  $20/4$  =Rs.5
- 3) EPS after repurchase=  $440/99$ =Rs.4.44
- 4) PE ratio after repurchase=  $20/4.44$ =4.504

If we assume that the PE ratio will remain same after repurchase the price per share would be PE ratio X EPS;  $5 \times 4.44 = 22.2$

But if take the new PE ratio into consideration price would be

$$4.5 \times 4.44 = 19.9977$$

In the above example the company's EPS has increased, but there is a corresponding decrease in the PE ratio. One possible reason for decrease in PE ratio after repurchase is that the buyback results in higher debt equity ratio (since equity portion is reduced) and this is perceived by the investors as riskier and as a result future earnings are discounted at higher rates, which reduces the PE ratio.

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## **16.8 LET US SUM UP**

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Dividends have a psychological appeal to investors and convey information about firms prospects to the investors and other stakeholders. While designing the dividend policy the firm has to reconcile to the investment needs of the firm and the desire of the shareholders for current income. Apart from this the dividend policy is also constrained by the legal, fiscal and contractual constraints. Liquidity and working capital requirements also play

a crucial role in operationalisation of the pre defined dividend policy. Stability of dividends is one of the important aspect of the dividend policy and dividends are generally sticky in nature as they do not change with temporary change in the income of the firm. Corporate dividend behavior modeled using Linter's model have shown that firms have long term payout ratio and they attain the same gradually. Firms are reluctant to cut dividends. Cash dividends are the most preferred mode of distribution of cash to the shareholders, but in recent times the companies are also using other means of returning cash to the shareholders. Some of these techniques are bonus issue, share buyback and dividend reinvestment plans.

## 16.9 KEY WORDS

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**Bonus Shares** : Shares issued to existing shareholders in certain proportion of their holdings.

**Buyback** : outstanding shares held by shareholders is bought back by the company thereby reducing number of outstanding shares.

**Dividend equalization reserve** :Reserve created to maintain a stable dividend.

**Dividend Smoothing** : Dividend policy action in which abrupt changes in dividends is avoided.

**Residual Dividend** : As per this theory dividend is residual payment of income left after making investments.

## 16.10 SELF-ASSESSMENT QUESTIONS

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- 1) Explain the nature of factors that influence the dividend policy of a firm.
- 2) Is it rational for a firm to borrow money and pay dividends to the shareholders? Explain.
- 3) Why do shareholders have a strong preference for dividends?
- 4) State the difference between the policy of stable dividend payout ratio and policy of steadily changing dividends.
- 5) Explain the residual policy of dividend payment.
- 6) Explain the difference between the following approaches:
  - 1) Pure residual dividend approach.
  - 2) Fixed dividend payout ratio approach
  - 3) Smoothed residual dividend approach.
- 7) Explain the Linter's model of corporate dividend behavior.
- 8) What is bonus issue of shares. Discuss the consequences of bonus issue.
- 9) What is share buyback. Discuss the rationale for share buyback.

**NOTE: These questions will help you to understand the unit better.  
Try to answer them but do not submit the answers to the University.  
These questions are for practice only.**

**BLOCK 5**

**WORKING CAPITAL DECISIONS**

## **BLOCK 5 WORKING CAPITAL DECISIONS**

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This is the fifth block of this course. It deals with the aspects of short term assets. The main objective of managing short term assets (current assets) is to have adequate flow of income and liabilities in the balance sheet and have liquidity. This block focuses on management of current assets. It contains four units

**Unit 17 Working Capital: An introduction:** It explains the concept, categories and components of working capital, the significance, factor affecting working capital and short term finance. It further elaborates on types, importance and factors affecting operating cycle and risk-return trade-off in working capital.

**Unit 18 Cash Management:** It discusses motives for holding cash, objectives and functions of cash management. It also discusses importance of cash forecasting and budgeting and methods of preparing cash budgets. It further explains payable and receivables cash management, benefits of good cash management and types of cash management models.

**Unit 19 Receivables Management:** It discusses credit policy, factors affecting the size of receivables and dimensions of receivables management. It further discusses cost and benefit of receivable management, approaches to evaluation of credit policies and concept of factoring and forfaiting.

**Unit 20 Inventory Management:** It describes the types of inventory and need for holding inventory, the factors influencing inventory management and benefits of inventory management. It also discusses the different cost involved and benefits of inventory management, techniques of inventory management and inventory turnover ratios.

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# **UNIT 17 WORKING CAPITAL : AN INTRODUCTION**

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## **Structure**

- 17.1 Objectives
  - 17.2 Introduction
  - 17.3 Working Capital Components
  - 17.4 Types of Working Capital
    - 17.4.1 On the Basis of Concept
    - 17.4.2 On the Basis of Time
  - 17.5 Importance of Adequate Working Capital
  - 17.6 Factors Affecting Working Capital
  - 17.7 Financing of Current Assets
  - 17.8 Sources of Short Term Finance
  - 17.9 Operating Cycle: An Overview
  - 17.10 Factors Affecting Operating Cycle
  - 17.11 Benefits of a Shorter Operating Cycle
  - 17.12 Types of Operating Cycle
    - 17.12.1 Gross Operating Cycle
    - 17.12.2 Net Operating Cycle
  - 17.13 Approaches to Current Asset Financing
  - 17.14 Long Term Financing vs. Short Term Financing: Risk Return Trade-Off
  - 17.15 Cost and Benefits of Trade Credit
  - 17.16 Concept of Payables Management
  - 17.17 Payables Turnover Ratio or Average Age of Accounts Payable
  - 17.18 How to manage Payables effectively
  - 17.19 Let Us Sum Up
  - 17.20 Key Words
  - 17.21 Self-Assessment Questions
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## **17.1 OBJECTIVES**

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After studying the unit, you should be able to:

- describe the categories of working capital;
- explain the components of working capital;

- understand working capital classification on the basis of concept and time;
- explain the significance of working capital;
- describe factors affecting working capital;
- explain sources of short term finance;
- elaborate on types, importance and factors affecting operating cycle; and
- understand risk-return trade-off in working capital and payables management.

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## **17.2 INTRODUCTION**

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“Capital” is one of the primary factors of production required for business. For any business capital is required for dual purposes- for establishment and carrying out daily operations. Accordingly, it can be classified under the following two categories:

- 1) **Fixed Capital:** In any business, creation of production facilities like purchase of fixed assets (plant, machinery, building, land, etc.) require long-term funds. ‘Fixed Capital’ is the investment in long-term assets representing the part of firm’s capital which is blocked on a perpetual basis.
- 2) **Working Capital:** Working Capital is needed for short-term purposes for the purchase of raw materials, payment of wages and other day-to-day expenses etc. It is also referred to as ‘revolving capital’ or ‘circulating capital’ or ‘short term capital’. Invested funds in current assets are kept in circulation and are continuously transformed into cash which in turn is exchanged for other current assets.

As per Genestenberg, “Working Capital means current assets of a company that are changed from one form to another for e.g. cash to inventories, inventories to receivables and receivables to cash in the ordinary course of business”.

According to Ramamurthy, “It refers to the funds, which a company must possess to finance its day-to-day operations”.

It is a measure of the company’s liquidity, its short-term financial health and operational efficiency. It refers to the company’s capital that is required for financing current assets or short-term assets. It is a surplus of current assets over current liabilities. The management of working capital, if carried out efficiently, effectively and consistently, will assure the sound health of the organisation. Working Capital Management is related to the management of current assets, current liabilities and various inter-linkages between them. Working capital management refers to a managerial strategy designed to monitor and utilize the two components of working capital- current assets and current liabilities. Such a strategy ensures financial efficiency in operations of the company. The basic objective of working capital management is to manage current assets and current liabilities in such a way that a reasonable

level of working capital is maintained. This will ensure that the company always maintains satisfactory cash flow to meet its short-term operating costs and short-term debt obligations.

Management of working capital is three-dimensional in nature:

- a) Dimension I is related to policy formulation with respect to profitability, risk and liquidity.
- b) Dimension II is related to the making decisions with respect to the level and composition of current assets.
- c) Dimension III is related to making decisions with respect to the level and composition of current liabilities.

## **17.3 WORKING CAPITAL COMPONENTS**

The components of working capital include:

### **Current Assets**

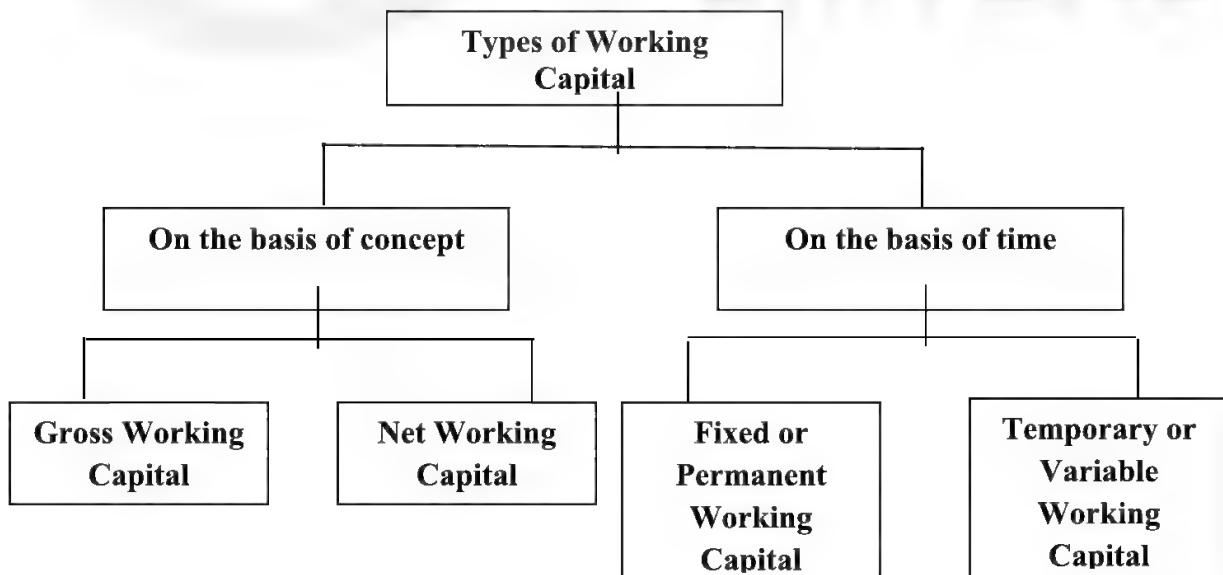
The assets of the organisation which can be converted into cash within a period of one year are called current assets, e.g. cash, inventories, marketable securities, debtors, bills receivable, prepaid expenses etc.

### **Current Liabilities**

The debts that need to be paid during the current accounting period or within one year are called current liabilities e.g. accounts payable, outstanding expenses, bank overdraft, creditors, dividend payable etc.

## **17.4 TYPES OF WORKING CAPITAL**

Working capital can be classified in the following way:



### 17.4.1 On the Basis of Concept

On the basis of concept, working capital is categorized as gross working capital and net working capital:

- i) **Gross Working Capital:** Under this concept, working capital refers to the sum total of all the current assets of business or the capital which is invested in total current assets of the company i.e. **Gross working capital = Total current assets.** It is based on financial or going concern concept.
- ii) **Net Working Capital:** According to this concept, working capital is the surplus of current assets over current liabilities i.e. **Net Working capital = Current Assets–Current Liabilities.** Net Working Capital can be simply be referred to as working capital. When current assets are more than current liabilities, working capital is positive and when current liabilities exceed current assets, working capital is in negative. An accounting concept of working capital is “Net working capital”.

You can understand Gross Working Capital and Net Working Capital from this example :

Balance Sheet as on 31/12/202

(Amount in Rupees)

Liabilities	Amount	Assets	Amount
Long Term Liabilities :		Fixed Assets :	
Share Capital 20,00,000		Land & Building 15,00,000	
Reserves 5,00,000		Plant & Machinery <u>10,00,000</u>	25,00,000
Debentures 10,00,000			
Secured Loans <u>5,00,000</u>	40,00,000	Current Assets :	
		Cash 1,00,000	
Current Liabilities :		Bank 2,00,000	
Bank Loan 5,00,000		Investments 5,00,000	
Bills Payables <u>5,00,000</u>	10,00,000	Bills Receivable 5,00,000	
		Debtors 2,00,000	
		Inventory <u>10,00,000</u>	25,00,000
	-----		-----
Total	50,00,000	Total	50,00,000
	-----		-----

On the basis of the above Balance Sheet, you can calculate Gross Working Capital and Net Working Capital.

(A)	Gross Working Capital	= Cash + Bank + Investments + B/R + Debtors + Inventories
		= (1,00,000 + 2,00,000 + 5,00,000 + 5,00,000 + 2,00,000 + 10,00,000)
		= Rs. 25,00,000
(B)	Net Working Capital	= Current Assets - Current Liabilities
		= 25,00,000 - 10,00,000
		= Rs. 15,00,000

**Illustration 1:** Calculate the Net Working Capital requirement of XYZ company from the information given below :

<b>Estimated Cost</b>	<b>Per unit (Rs.)</b>
Raw materials	300
Direct labour	100
Overheads	200
<b>Total</b>	<b>600</b>
Additional information:	
Selling price per unit	Rs. 700
Level of activities	1,56,000 units per annum
Raw materials in stock average	4 weeks
Work in progress assume 100% completion of materials and 50% for labour and overhead average	2 weeks
Finished goods in stock average	4 weeks
Credit allowed by suppliers average	4 weeks
Credit allowed to debtors average	8 weeks
Lag in payment of wages	2 weeks
Cash at Bank	Rs. 2,00,000

The production is for 52 weeks in the year.

**Solution:**

Statement of working capital requirement

<b>Current Assets</b>	<b>Amount (Rs.)</b>
Raw materials $3,000 \times 4 \times 300$	36,00,000
Work in Progress	

<b>Working Capital Decisions</b>		
Raw materials $3,000 \times 2 \times 300$		18,00,000
Wages ( $3,000 \times 2 \times 100$ ) 50%		3,00,000
Overheads ( $3,000 \times 2 \times 200$ ) 50%		6,00,000
Finished Goods ( $3,000 \times 8 \times 300$ )		72,00,000
Debtors ( $3,000 \times 8 \times 300$ )		72,00,000
Cash at Bank		2,00,000
Total current assets		2,09,00,000

### **Current Liabilities**

Creditors $3,000 \times 4 \times 300$	36,00,000
Outstanding wages $3,000 \times 2 \times 100$	6,00,000
Total Liabilities	42,00,000
<b>CA – CL</b> ( $2,09,00,000 - 42,00,000$ )	1,67,00,000

### **Working Notes :**

- 1) Annual production of 1,56,000 units in 52 weeks. Hence, weekly production is 3,000 units.
- 2) Debtors are taken at cost of production.

#### **17.4.2 On the Basis of Time**

On the basis of time, working capital may be classified as Permanent/Fixed working capital and Temporary/Variable working capital.

- i) **Fixed/Permanent Working Capital:** It refers to a minimum amount of current assets which is continuously required to carry out normal business operation of the enterprise. Minimum level of current assets is required to be maintained by every firm like cash, bank balance, stock etc. which is called ‘fixed/permanent working capital’ as this amount is permanently blocked in current assets.
- ii) **Temporary/Variable Working Capital:** It is the amount of working capital which is required to meet the periodic/seasonal demand and some exceptional needs of business. Any sum over and above the permanent level of working capital is referred to ‘temporary/variable working capital’.

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### **17.5 IMPORTANCE OF ADEQUATE WORKING CAPITAL**

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For a business to prosper, it is important to maintain a satisfactory amount of working capital. Working capital is important for the following reasons:

#### **1) Business Goodwill**

Adequate working capital helps in creating and maintaining business goodwill as it facilitates prompt payments for suppliers’ goods. Timely

payment of raw materials, salary and other overheads helps to maintain the goodwill of the company.

## 2) Regular Supply of Raw Materials

When businesses settle their debts on time, suppliers ensure regular supply of raw materials which in turn increases productivity in a firm. Firms with adequate working capital, therefore, enjoy steady supply of raw materials from their suppliers.

## 3) Smooth Business Operations

Adequate working capital enables smooth running of business operations as it helps in meeting day to day business requirements without the firm experiencing shortage of funds.

## 4) Strengthening the Solvency

Adequate working capital in business helps in maintaining the solvency of the business by providing adequate flow of cash, which in turns helps in paying the debts on time and thus helps in maintaining and strengthening solvency of business.

## 5) Helps to Face Contingencies

Adequate working capital enables businesses to face business crisis. A crisis occurs in a business when an unexpected situation puts the stability of the business at risk. Business crises that can be experienced by firms include financial crisis, technological crisis, personnel crisis, natural crisis and organisational crisis.

## 6) Taking Advantage of Opportunities

Favorable market conditions make it easier for businesses to purchase raw materials in bulk when the prices are lower, borrow money from banks at low interest rates and hold their current stock for future sales at higher prices. Firms with adequate working capital are able to take advantage of such opportunities.

## 7) Cash Discounts

Adequate working capital helps firms to make payments on time. This in turn enables firms to access cash discounts on purchases thereby reducing their operational cost.

## 8) Steady and Timely Dividends

Sufficient working capital enables firms to make regular and timely dividends to their investors. This enhances the confidence of investors in the enterprise.

## 17.6 FACTORS AFFECTING WORKING CAPITAL

The level of working capital required for smooth business operations depends upon multiple factors; some of them are listed below:

## 1) Nature of Business

The requirement of working capital depends on the nature of business. In the case of manufacturing businesses it takes more time in converting raw material into finished goods. Therefore, capital remains invested for a long time in raw material, semi-finished goods and the stock of the finished goods. Thus, more working capital is required. On the contrary, in case of trading business the goods are sold immediately after purchasing or sometimes the sale is effected even before the purchase itself. Therefore, very little working capital is required.

## 2) Competition

High level of competition increases the need for more working capital. In order to face competition, more stock is required for quick delivery and credit facility for a long period has to be offered. If the level of competition is low or the business is a monopoly, the requirement of working capital will be less as the business controls the terms of services.

## 3) Scale of Operation

There is a direct link between the working capital and the scale of operations. In other words, more working capital is required in case of big organisations while less working capital is needed in case of small organisations.

## 4) The Status of the Economy

The conditions of the market, global economy, political status, environmental conditions and the status of the domestic economy affect working capital. These factors, however, affect large scale businesses more often than small scale businesses.

## 5) Supply of Raw Materials

If there is ready supply of raw materials in the firm, the amount of working capital will be lesser than if there is shortage of raw materials in the firm. Unsteady supply of raw materials also threatens the financial status and the overall status of a business. If the firm uses rare raw materials like mineral ores or imported raw materials, the requirement of working capital will be higher. It is because the firm will have to procure such raw materials well in advance to avoid any bottlenecks in the production process.

## 6) Operating Efficiency

Businesses with high degree of operating efficiency require less working capital as compared to those with low degree of operating efficiency. Businesses with high operating efficiency have lower wastage and they also incur lesser expenses.

## 7) Inflation

Inflation refers to a sustained rise in prices of goods. In such a situation, more working capital is required in order to maintain the previous scale of production and sales. Therefore, with the increasing rate of inflation, there is a corresponding increase in the working capital.

## 8) Availability of Credit from Suppliers

If the suppliers extend liberal credit policy terms to the company, less working capital will be required to run the business. If the terms are unfavorable, that is, credit is not easily available, then larger amount of working capital will be required to run the business.

## 9) Production Policy of the Firm

Production policy can either be seasonal or uniform. If the production cycle is shorter less working capital is required to manage the firm. On the other hand, if the production cycle is longer, larger amount of working capital is required to carry out daily business activities especially during the peak season.

## 10) Growth and Expansion of a Business

Rapidly growing firms need additional funds to continuously cope up with the changes in the business environment, implying larger working capital requirements. On the other hand businesses that experience slow growth have lower working capital requirements.

## 17.7 FINANCING OF CURRENT ASSETS

Financing of current assets involves meeting daily business demand of short term assets. It is a significant aspect of working capital management. An important challenge in current asset financing is making a choice regarding the sources of finance. The company has to decide amongst the different fund sources which may be adopted to invest in current assets. In order to make a quick decision, working capital can be broken down into temporary and permanent components. The two components of working capital need to be financed from different sources of finance as enumerated below:

### Sources of Finance

- **Long-Term Sources:** Funds are provided for a comparatively longer period of time usually more than one year. These include: share capital, retained earnings, debentures, long term borrowing etc.
- **Short-term Sources:** Funds are provided for a shorter span of time, usually one year or less. These include: bank credit, commercial papers, public deposits etc.
- **Transactional Sources:** Funds are provided to the business through normal day-to-day business transactions including trade credit from vendors and other expenses.

## 17.8 SOURCES OF SHORT TERM FINANCE

Short-term finance refers to the funds that an individual or a firm may need for short periods of time, usually one year or less. Short term funds may be needed usually when there is uneven cash flow within the firm. They are usually more convenient and increase the rate of growth of a firm when managed properly. The various short term finance sources are as follows:

## 1) Trade Credit

This is one of the easiest and most convenient sources of finance available to firms as it puts less pressure on the flow of cash. It is an arrangement between a firm and its suppliers to pay for goods and services in the future as per the terms of sales invoice. Trade credit is generally given on open account basis. The supplier evaluates the credit worthiness of the buyer before supplying the goods and provides appropriate credit terms depending upon the credit worthiness of the buyer. Credit term, specify the conditions under which a firm is required to pay back the money due including the length, commencement of date of credit period, cash discount, if any. Though trade credit is flexible, informal and easy, the associated costs have to be considered. Therefore, it is necessary to find out the cash discount that the supplier is willing to offer for immediate payment without credit.

## 2) Advances from Agents and Customers

Some customers and agents tend to pay cash before the payment becomes due. This helps the firm to access extra funds and facilitate business growth, productivity and efficiency.

## 3) Overdraft

It is a facility which is provided by banks and it allows a firm to withdraw funds more than the current balance. The amount withdrawn can be used by the firm to manage the cash flow gaps that may interfere with the smooth running of a firm. The benefit is that the interest charged is calculated only on the amount of cash utilized by the business.

## 4) Bank Loans

Commercial banks usually provide a large portion of capital to businesses by providing a variety of loan services designed to meet the specific needs of a growing business. Banks also provide secured loans to firms in the form of pledge and mortgages and purchase/discount of bills. A bill arises out of trade transaction. The seller of goods draws bill on the buyer. A bill may be clean or documentary and may be payable on demand or after assurance period which is not more than 90 days. On acceptance of the bill by the buyer the seller presents it to the banks for discount/purchase and then the bank releases the funds to the seller. After that on due date, the bank presents the bill to the buyer and gets the payments. Co-operative bank is a reliable source to obtain short-term finance. Such banks are established at local, district and state level.

## 5) Commercial Paper

Commercial paper is a short-term unsecured provisionary note issued by large corporations which enjoy high credit rating. The maturity period could range from 90 to 180 days. It is sold on a discount basis from its face value and redeemed at its face value. Commercial paper is an unsecured instrument of financing. There are certain conditions as per RBI, which a company has to fulfill before it issues commercial paper.

## **Check Your Progress A**

**Working Capital :  
An Introduction**

- 1) What are the components of working capital?

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- 2) Enumerate the different types of working capital.

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- 3) Enlist the different types of short term finance.

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## **17.9 OPERATING CYCLE : AN OVERVIEW**

Operating cycle is defined as the period during which a company acquires raw materials, produces goods, sells them and receives cash from the sales of its goods and services. It is an important determinant of the sum of working capital a firm needs to carry out its daily business operations. A firm with extremely short operating cycle requires less working capital to cater for its business needs. If a company is a trading firm, then its operating cycle constitutes the period between the initial cash expenditure and receipt of cash from its consumers. It consists of the following stages:

- 1) Purchasing raw material
- 2) Paying suppliers
- 3) Changing raw materials into work in progress/finished/final products
- 4) Selling finished/final products (Cash or credit)
- 5) Collecting cash from sale/receivables

## 17.10 FACTORS AFFECTING OPERATING CYCLE

Operating cycle is a measure of a company's operating efficiency. The operating cycle helps in estimating the amount of working capital that a company would require to maintain and grow its business successfully. A company with an extremely short operating cycle requires less cash to maintain its operations and is generally preferred. On the other hand, a longer operating cycle can create cash flow problems.

The following factors influence the operating cycle of a company:

- a) **Trade Credit Terms:** Credit terms are the payment requirement which are stated on the invoice. Generally, seller offers early payment terms to their customers to get the cash faster. Longer payment terms offered by suppliers shorten the operating cycle of firms as the payments can be made later..
- b) **Credit Policy of a Company:** Credit policy are the guidelines that sets credit and payment terms for customers. If liberal credit terms are offered to the customers, operating cycle becomes larger.
- c) **Managerial Efficiency:** Management decisions can impact the operating cycle of a business. If the management of a firm is less efficient, operating cycle becomes longer. On the other hand, more efficient management is associated with shorter operating cycle.

## 17.11 BENEFITS OF A SHORTER OPERATING CYCLE

- a) **Facilitates More Investments:** The cash received from sales can be used for investments by the firm, thus enhancing business growth.
- b) **Helps in Improving Production Rate:** Business goods are sold faster which triggers the need for more goods by customers.
- c) **No Piling Up of Stocks:** Business assets are converted into cash at a faster rate so there is a reasonable quantity of stock lying in the inventory. This ensures more liquidity.
- d) **Adequate Working Capital:** Shorter operating cycle helps in managing adequate working capital required to run daily business activities.

## 17.12 TYPES OF OPERATING CYCLE

### 17.12.1 Gross Operating Cycle

It refers to the period between purchase of raw materials and receiving payment from the sale of the final products. It can be divided into Inventory Conversion Period and Receivables Collection Period. It is calculated as:

**OR** Operating Cycle = Raw Material Holding Period + Work-in-process Period + Finished Goods Holding Period + Receivable Collection Period.

### **17.12.2 Net Operating Cycle**

It is the period between paying for inventory and collection of cash due from sales. It is also called as ‘Cash Conversion Cycle’. Net Operating Cycle and Gross Operating Cycle go hand in hand. It is calculated as follows:

Net Operating Cycle = Gross Operating Cycle – Creditors’ Payment Period

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## **17.13 APPROACHES TO CURRENT ASSET FINANCING**

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There are basically three approaches to financing of current assets (WC).

These are:

- i) Hedging approach;
- ii) Conservative approach;
- iii) Aggressive approach.

### **1) The Hedging/Matching Approach**

With reference to financial mix, hedging is the procedure of matching debt securities with the security of financial demands. According to the ‘hedging approach’, maturity of short term finance sources should match the nature of asset being financed. The matching approach categorizes the total working capital requirements into two categories:

- ‘Fixed/Permanent working capital’ is the minimum level of working capital to meet daily business obligations.
- ‘Seasonal/Temporary working capital’ is required to meet urgent demands of the business and varies with time.

‘The hedging/matching approach’ propounds that the fixed working capital should be financed from the long-term sources while the seasonal working capital should be financed from short-term sources.

#### **Advantages of Hedging Approach**

- It reduces the cost of financing
- It involves minimum investment in net working capital

#### **Disadvantages**

- Considerable efforts are required to arrange funds.
- Involves high risk as sudden shock is dangerous to the business

## 2) The Conservative Approach

Under this approach, the manager aims at avoiding the risk of insolvency. Consequently, most of the working capital requirements are predominantly funded by long-term sources of finance. The short-term finance is limited to fund the business emergencies only. The proportion of long term sources in the working capital determines the degree of conservativeness of the working capital policy of the firm.

### **Advantages**

- It is less risky compared to hedging approach as the business is able to absorb shocks.
- Business does not experience frequent financial break downs.

### **Disadvantages**

- Involves relatively higher cost of financing
- Large investment can be blocked by permanent working capital

## 3) The Aggressive Approach

This approach suggests that a higher proportion of short-term sources should be used to fund short term liabilities and even a part of long term liabilities. A business that uses this approach must be ready to refinance its debt more frequently and this enhances the risk that it will be unable to meet future business demands. The aggressive approach suggests that the short-term sources should finance a portion of permanent working capital.

### **Advantages:**

- Financing at lower cost
- Minimizes excess liquidity

### **Disadvantages:**

- The risk of insolvency is greater
- Frequent re-arrangement of funds may be required

**Illustration 2 :** The following is the information of ABC company about total funds required, permanent funds required and seasonal requirements. Calculate the cost of working capital under hedging and conservative plan. The cost of short-term funds is 3% and long-term funds are 10%.

(figures in Rupees)

Month	Estimated funds required	Permanent funds	Seasonal requirement
January	1,20,050	1,00,000	20,050
February	1,20,000	1,00,000	20,000
March	1,15,000	1,00,000	15,000
April	1,10,000	1,00,000	10,000
May	1,15,000	1,00,000	15,000

June	1,25,000	1,00,000	25,000
July	1,15,000	1,00,000	15,000
August	1,10,000	1,00,000	10,000
September	1,20,000	1,00,000	20,000
October	1,20,000	1,00,000	20,000
November	1,80,000	1,00,000	80,000
December	1,60,000	1,00,000	60,000
Total			3,10,050

**Solution:**

Hedging approach

$$\text{Total monthly seasonal requirement} = \frac{\text{Total seasonal requirement}}{\text{Number of months}}$$

$$\text{Total monthly seasonal requirements} = 3,10,000 / 12 = 25,833.33$$

$$\text{Short-term cost} = 25,833.33 \times 0.03 = ₹775$$

$$\text{Long-term cost} = 1,00,000 \times 0.10 = ₹10,000$$

$$\text{Total cost} = ₹10,000 + ₹775 = ₹10,775$$

**Conservative approach**

The cost of financing under the conservative plan = cost of long-term funds. The maximum long-term funds are in November which is 1,80,000, the total requirements including 1,80,000 in November will be financed by long-term funds. The net working capital is highest in November i.e. 1,80,000 - 1,00,000 = Rs. 80,000.

$$\text{Cost of financing} = 1,80,000 \times 0.10 = \text{Rs. } 18,000$$

Cost of financing is higher in conservative approach.

## 17.14 LONG TERM FINANCING VS. SHORT TERM FINANCING: RISK RETURN TRADE-OFF

While deciding the sources of acquiring funds, the firm faces a trade-off between risk and return - whether to use long-term sources or short-term sources. Generally, as maturity of a debt increases, the rate of interest also increases. This implies that a firm which uses long term sources incurs more financing cost than a firm resorting to short term sources. Risk and return increase with an increase in short term sources. Therefore, an adequate balance needs to be maintained between risk and return while selecting a source of finance.

In considering liquidity (risk) and profitability (return) two important points are to be considered : (a) costs and (b) risks. In aggressive policy, the investment in current assets is low. That will involve shortage of cash fall in production and sales and loss of customer's goodwill. In conservative approach the investment in current assets is higher. That involves carrying costs in the form of financing a higher level of current assets like granting liberal credit to customers. The second element risk increases if there is lower level of liquidity. The firm may become technically insolvent by not paying current liabilities as they occur. So there should be a trade off between profitability and liquidity.

**Check Your Progress B**

- 1) What are the different stages of operating cycle?

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- 2) Throw some light on the types of operating cycle.

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- 3) What are the advantages and disadvantages of the three approaches to current asset financing?

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## **17.15 COSTS AND BENEFITS OF TRADE CREDIT**

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**A) Costs of Availing Trade Credit**

There is a general perception that the trade credit does not carry any cost. However, it carries the following costs:

- i) **Price:** There is often a cost involved in the form of discount forgone when a firm chooses to use trade credit rather than paying immediately. This discount can translate into a higher implicit cost.
- ii) **Loss of goodwill:** If the credit is overstepped, suppliers may discriminate against delinquent customers if supplies become short.
- iii) **Cost of managing:** Management of creditors involves some accounting and administrative costs.
- iv) **Conditions:** Most of the suppliers put conditionalities while providing trade credit like minimum order size, mode of payment etc.

#### B) Benefits of Availing Trade Credit

- i) **Deferred Payment:** Purchase of raw materials on credit allows a firm to delay the outflow of cash while accessing business resources instantly.
- ii) **Better Working Capital Management:** Efficient management of payables can contribute to effective and efficient working capital management.
- iii) **Impact of Inflation:** If the inflation persists, then borrowers are favored over the lenders as they were better off paying the fixed outstanding amount later than sooner. The subsequent transactions shall also be at higher prices.
- iv) **Type of Interest Free Loan:** Trade credit is a type of interest free loan, therefore failure to avail this facility has an interest cost. This cost is further increased if interest rates are higher.

### **17.16 CONCEPT OF PAYABLES MANAGEMENT**

Payables represent the amount of cash that a firm owes to its vendors and creditors for the supply of raw materials. Management of payables refers to the policies, procedures and practices that guide an organization's credit purchases. It encompasses trade credit lines, managing the flow and timing of purchases and securing favorable credit terms from its suppliers. Payables are a vital part of effective cash management and should be managed carefully to enhance the cash position. The payables are recorded in the balance sheet of a company under the head of current liabilities. Accounts payable mostly consist of accrued expenses and short-term financing of inventories.

### **17.17 PAYABLES TURNOVER RATIO OR AVERAGE AGE OF ACCOUNTS PAYABLE**

'Payables Turnover Ratio' indicates the pattern of payment of accounts payable. It helps in measuring the average number of times a firm pays its creditors during a specific period of time. It is calculated as follows:

$$\text{Payables Turnover Ratio} = \frac{\text{Net Credit Purchases}}{\text{Average Accounts Payable}}$$

Where, Average Accounts Payable = (Opening Accounts Payable + Closing Accounts Payable) /2

Average Payment Period = Number of days or months in a year / Payables Turnover Ratio

**Significance:** It reveals average payment period. A lower ratio indicates that the credit allowed by the supplier is for a long period or it may reflect delayed payment to suppliers which is not a very good policy as it may affect the goodwill of the business. On the other hand, a higher turnover ratio indicates that the company pays its suppliers at faster rates than its competitors. Days in payables outstanding (DPO) is a tool used by the organizations to determine an optimal timing of payments for its payables.

### Illustration 3:

Mahindra CIE Ltd. reported annual purchases on credit of INR 123,555 and returns of INR 10,000 during the year ended December 31, 2020. Accounts payable at the beginning of the year were INR 12,555 and at the end of the year were INR 25,121. Calculate the company's Payables Turnover Ratio.

### Solution:

To start with, we shall determine the net credit purchases by subtracting annual returns from annual credit purchases:

$$\begin{aligned}\text{Net credit purchases} &= 1,23,555 - 10,000 \\ &= ₹1,13,555\end{aligned}$$

$$\begin{aligned}\text{Average accounts payable} &= (12,555 + 25,121) / 2 \\ &= 37,676 / 2 \\ &= ₹18,838\end{aligned}$$

**Payables Turnover Ratio** = Net Credit Purchases / Average Accounts Payable

$$\begin{aligned}\text{Payables Turnover Ratio} &= 1,13,555 / 18,838 \\ &= 6.03\end{aligned}$$

### Illustration 4:

Calculate the (a) Payables turnover ratio and (b) Average Payment Period from the following figures:

(figures in Rs.)

Credit purchases during 2019-20	12,00,000
Creditors on 1.4.2019	3,00,000
Bills Payables on 1.4.2019	1,00,000
Creditors on 31.3.2020	1,30,000

Bills Payables on 31.3.2020	₹70,000	Working Capital : An Introduction
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### Solution:

**Payables Turnover Ratio = Net Credit Purchases / Average Accounts Payable**

Average Accounts Payable = (Opening Accounts Payable + Closing Accounts Payable) / 2

Average Accounts Payable = (Creditors in the beginning + Bills payables in the beginning + Creditors at the end + Bills payables at the end) / 2

$$= (\text{₹}3,00,000 + \text{₹}1,00,000 + \text{₹}1,30,000 + \text{₹}70,000) / 2$$

$$= \text{₹}3,00,000$$

a) Payables Turnover Ratio = ₹12,00,000 / ₹3,00,000

$$= 4 \text{ times}$$

b) Average Payment Period = No. of days or months in a year / Payables

Turnover Ratio

$$= 365 / 4$$

$$= 91.25 \text{ days}$$

## 17.18 HOW TO MANAGE PAYABLES EFFECTIVELY

You know that every firm has to pay what it owes. Managing accounts payable effectively helps the business to avoid the related risks. In order to manage payables effectively, the business can adopt the following measures :

- 1) **Centralising accounts payable processing and reporting system** :The centralized accounts processing and reporting system across the enterprise would ensure that all the employees adhere to common practices and standards.
- 2) **Good and strong governance practices** :Good governance practices should be adopted as it will reduce the risk of manual error and strengthen accounts payable management system.
- 3) **Purchasing approval** :The level of management authority responsible for various purchases need to be defined properly. It may differ depending on price or quantity of purchases.
- 4) **Supplier Portals** :Supplier portals should be set-up to enable the suppliers to track what the firm is doing, the status of orders, delivery schedules, potential product shortages and payments received. The business should keep preferred supplies list to prevent maverick buying.
- 5) **Management Workflows** :Setting-up management workflows can help enterprises to quickly identify problems and streamline their accounts payable process.

- 6) **Paperless Environment :** Automating the payables management using Electronic Data Interchange (EDI) will help smoothen the approval process and create more timely payments. It would also enable the enterprise to take advantage of available discounts and rebates for early payments.
- 7) **Update Payment Terms :** Payment terms and availability of discounts, trade credit and other rebates should be regularly updated.
- 8) **Properly manage invoice process :** Avoid paying the invoices early, but not at the cost of relationship with supplies. Pay invoices only when they are due.

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## 17.19 LET US SUM UP

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“Working capital” is a measure of firm’s liquidity, its short-term financial health and operational efficiency. It refers to the firm’s capital which is essential for financing current assets or short-term assets. Working Capital Management implies the management of current assets, current liabilities and various inter-linkages between them. Current Assets and Current Liabilities are two main components of “Working Capital”. On the basis of ‘concept’, working capital can be categorized as Gross Working Capital (Total Current Assets) and Net Working Capital (Current Assets–Current Liabilities). On the basis of ‘time’, working capital may be categorized as ‘Permanent/Fixed working capital’ (minimum level or amount of current assets which is continuously required) and ‘Temporary/Variable working capital’ (sum of working capital which is required to meet the seasonal/temporary demand). There are numerous factors that influence the amount of working capital which is required by a company like nature of the business, competition, scale of operations, the status of the economy, supply of raw materials, operating efficiency, inflation etc. Short term finance refers to funds that an individual or a firm may need for a short period of time, usually one year or less. The sources of short-term finance are trade credit, advances from customers and agents, overdrafts, commercial bank loans, secured loans, cash credits and loans from cooperative banks.

Operating cycle is defined as the period during which a firm acquires raw materials, produces goods, makes sales and receives cash from the sales of its goods and services. It consists of the following stages: procuring raw material, payment to suppliers, transforming raw material into finished products, selling finished/final products and collecting cash from sale. There are two types of operating cycles: ‘Gross operating cycle’ (the period between purchase of raw materials and receipt of payment from sales of the final product) and ‘Net Operating Cycle’ (period between paying for inventory and collection of cash received from sales).

The financing of short term business assets involves tradeoff between risks incurred in investments and investment returns. Risk-return trade off links high risk and high investment returns. The following are the approaches to current asset financing: a) Hedging approach, b) Conservative approach and c) Aggressive approach. Risks and returns increase with increases in short

term sources. Therefore an adequate cash balance needs to be maintained between risks and returns when selecting a source of financing. The firm should also manage its payable effectively.

## 17.20 KEY WORDS

**Accounts Payable:** Money that is owed by a firm to its creditors.

**Bank Overdraft:** It is a flexible borrowing facility on a bank current account which is repayable on demand.

**Capital:** Wealth in the form of money or other assets owned by a person or a firm.

**Commercial Papers:** It is an unsecured, short-term debt instrument issued by a firm, typically for the financing/meeting short term liabilities like accounts payable, inventories etc.

**Debentures:** Refers to a long-term security issued by a firm, which yields a fixed rate of interest and is secured against assets of the company.

**Dividend Payable:** Refers to dividends that a firm's board of directors has declared to be paid to its current shareholders.

**Factors of Production:** Refers to the resource inputs needed by producers/manufacturers in order to generate output of goods and services.

**Finished Goods:** They are goods that have been completed/finished by the manufacturing process, or bought in a completed form, but are yet to be sold to consumers.

**Inflation:** It is a general rise in prices and decrease in the purchasing value of money.

**Inventory:** It refers to the products available for sale and the raw materials used to create/produce finished goods

**Marketable Securities:** Securities that are to be sold or redeemed within an year.

**Outstanding Expenses:** The expenses which have been incurred by an organization during the current accounting period and are due to be paid.

**Prepaid Expenses:** They are the future expenses which have been paid in advance.

**Public Deposits:** It refers to the unsecured deposits raised by a firm from public, mainly to meet their working capital needs.

**Receivables:** Receivables are amounts owed by outsiders to a business and are regarded as assets.

**Work-In-Progress:** An unfinished task that is still being added to or developed.

## 17.21 SELF-ASSESSMENT QUESTIONS

- 1) Define Working Capital. What are the bases on which it can be classified?
- 2) Enumerate the important factors affecting working capital needs in an organisation.
- 3) Explain different stages involved in Operating Cycle. Distinguish between Gross Operating Cycle and Net Working Capital.
- 4) What are different approaches to current asset financing? Explain their advantages and disadvantages.
- 5) Explain different sources of short term finance available to the organisation?

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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# **UNIT 18 CASH MANAGEMENT**

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## **Structure**

- 18.1 Objectives
  - 18.2 Introduction
  - 18.3 Motives for Holding Cash
  - 18.4 Objectives of Cash Management
  - 18.5 Functions of Cash Management
  - 18.6 Cash Forecasting and Budget: Meaning and Importance
  - 18.7 Methods of preparing the Cash Budget
  - 18.8 Payables Cash Management
  - 18.9 Receivables Cash Management
  - 18.10 Benefits of Good Cash Management
  - 18.11 Optimal Cash Balance
    - 18.11.1 The Baumol Model
    - 18.11.2 The Miller-Orr Model
  - 18.12 Let Us Sum Up
  - 18.13 Key Words
  - 18.14 Self-Assessment Questions
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## **18.1 OBJECTIVES**

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After studying the unit, you should be able to:

- understand motives for holding cash;
  - discuss objectives of cash management;
  - explain functions of cash management;
  - understand the importance of cash forecasting and budget;
  - understand the various methods of cash flow budgeting;
  - explain the difference in payables and receivables cash management;
  - describe the benefits of good cash management;
  - understand the concept of optimal cash balance; and
  - understand the different types of cash management models.
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## **18.2 INTRODUCTION**

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Cash management refers to the process of collecting, handling, controlling, and investing of a firm's available funds to ensure adequate utilization of the

company's resources. It is essential to maintain a satisfactory amount of cash to run business activities smoothly. It is concerned with the managing of:

- i) Cash inflows and outflows of the firm;
  - ii) Cash flows arising within the firm; and
  - iii) Cash balances held by the firm at a given point of time by financing deficit or investing of the surplus cash.
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### 18.3 MOTIVES FOR HOLDING CASH

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Three basic considerations in determining the liquidity or the amount of cash as outlined by Lord Keynes (a British Economist) are:

- a) **Transaction need:** Cash helps in meeting the day-to-day expenses and other debt payments of the companies. Normally, the collection of cash (from sale of goods and services, sale of assets, and additional financing) is not perfectly synchronised with the disbursement of cash (for purchase of goods and services, purchase of capital assets, and meeting other liabilities). Hence, some buffer cash balance is required at most of the times.
- b) **Speculative needs:** Firms would like to tap profit making opportunities arising from fluctuations in commodity prices, security prices, interest rates, and foreign exchange rates. A cash-rich firm is better prepared to exploit such bargains. However, for most firms their reserve borrowing capacity and marketable securities would suffice to meet their speculative needs.
- c) **Precautionary needs:** There may be some uncertainty about the magnitude and timing of cash inflows from the sale of goods or services, the sale of assets, and issuance of securities. Likewise, there may be uncertainty about cash outflows on account of purchases and other obligations. To protect itself against such unexpected events, a firm may require some cash balance.

### 18.4 OBJECTIVES OF CASH MANAGEMENT

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The objectives of cash management are:

- a) To ensure steady and adequate supply of funds for the business operations.
- b) To ensure that cash designated for investments lands in safe ventures.
- c) To facilitate optimum utilization of organisational funds.
- d) To make timely payment of cash in the normal course of business.
- e) To minimize the amount blocked up as cash balance. The business should have optimal amount of cash balance.

## 18.5 FUNCTIONS OF CASH MANAGEMENT

- a) **Estimation of Required Capital:** Finance Managers work to ensure the right calculation of the required capital depending on the costs they plan to incur, the expected profits and the future policies and programs of the firm.
- b) **Allocation of Funds:** It is the job of the cash manager to decide how funds are to be allocated, to whom they are to be allocated and for what purposes.
- c) **Control over Business Funds:** Cash management has full control over cash available in the organisation. It plans on how funds are utilized on organisational projects.
- d) **Handling Unexpected Costs:** Cash management handles costs that may arise as a result of unexpected situations, for instance-breakdown of machinery.
- e) **Initiates Investments:** Cash management ensures that extra funds in the business are invested in the best market opportunities.

## 18.6 CASH FORECASTING AND BUDGET: MEANING AND IMPORTANCE

Cash budgeting or short-term cash forecasting is the principal tool of cash management.

Cash Budget is one of the most significant devices that helps businesses to plan for and control cash receipts and payments. It represents the cash requirements of business during the budget period. On the basis of cash budget, the firm can decide whether to invest surplus cash in marketable securities and earn profits; or in case of any shortages, manage it by availing overdraft or credit arrangements with banks.

Cash budgets, routinely prepared by business firms, are helpful in:

- estimating cash requirements,
- planning short-term financing,
- scheduling payments in connection with capital expenditure projects,
- planning purchases of materials,
- developing credit policies, and
- checking the accuracy of long-term forecasts.

**The importance of cash budgets can be summarized as follows: -**

- a) **Usage of Cash:** Management can plan out the usage of cash in accordance with the changes of receipt and payment.
- b) **Provision of Excess Funds:** It helps in pinpointing the periods of excess cash than required. In this regard management can decide to invest the

surplus funds for short term or long-term period, according to the requirements in the business and earn profits.

- c) **A Pay-out Policy:** This budgetary system may help the management for future pay-out policy in the form of dividend. At the times of favourable cash budget (liquid) position, the management may decide upon increasing the rate of dividend or retaining the cash balance for future use.
- d) **Provision for acquiring Funds:** It gives the top level management ideas for acquiring funds for particular time duration and the various sources that can be explored.
- e) **Profitable Use of Cash:** Business person can take decision for the best use of liquidity to make more profitable transaction. It enables firm which has sufficient cash to take advantage like cash discounts on its accounts payable

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## 18.7 METHODS OF PREPARING THE CASH BUDGET

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A cash budget can be prepared in the following ways:

- a) **Receipts and Payments Method:** This method is the most popular and is universally used for preparation of the cash budget. This method considers all the expected receipts and payments for the budget period. All the cash inflow and outflow of all functional budgets including capital expenditure budgets are considered. Accruals and adjustments in accounts will not affect the cash flow budget. Anticipated cash inflow is added to the opening balance of cash and all cash payments are deducted from this to arrive at the closing balance of cash.
- b) **Adjusted Net Income Method (Adjusted Profit and Loss Method):** In this method the annual cash flows are calculated by adjusting the sales revenue and cost figures for delays in receipts and payments (change in debtors and creditors) and eliminating non-cash items such as depreciation.
- c) **Balance Sheet Method:** In this method, the budgeted balance sheet is predicted by expressing each type of asset (except cash & bank) and short-term liabilities as percentage of the expected sales. The profit is also calculated as a percentage of sales, so that the increase in owner's equity can be forecasted. Known adjustments, may be made to long-term liabilities and the balance sheet will then show if additional finance is needed (if budgeted assets exceed budgeted liabilities) or if there will be a positive cash balance (if budgeted liabilities exceed budgeted assets).

**Illustration 1:**

Balance Sheet			
	Rs. (as on 1/1/2020)		Rs.
Share Capital	1,50,000	Land & Building	90,000
Capital Reserve	15,000	Plant and Machinery	60,000
P&L A/c	27,000	Furniture & fixtures	15,000
Debentures	30,000	Closing stock	12,000
Creditors	86,400	Debtors	78,000
Outstanding expenses	600	Bank	54,000
	309,000		309,000

**Projected Trading and Profit and Loss A/c**

For the year ending 31/12/2020

	Rs.		Rs.
Opening Stock	12,000	Sales	2,40,000
Purchases	1,80,000	Closing Stock	30,000
Gross profit c/d	78,000		
	2,70,000		2,70,000
Salaries and Wages 7,500		Gross profit b/d	78,000
Add outstanding <u>1,500</u>	9,000	Interest received	300
Depreciation:			
Plant and Machinery	6,000		
Furniture and Fixtures	3,000		
Administration explain	10,500		
Selling expenses	7,500		
Net Profit	42,300		
	78,300		78,300
Dividend paid	30,000	Balance b/f	27,000
Balance carried to Balance sheet	39,300	Net Profit	42,300
	69,300		69,300

The following are the additional information for the year 2020.

Share capital to be issued Rs. 30,000 and debentures 6,000 on 31/12/2020, the outstanding expenses Rs. 1,500, debtors Rs. 60,000, creditors Rs. 90,000 and land and building Rs. 1,20,000.

**Cash Budget**

**Adjusted Profit and Loss Method**

(Period ending 31 December 2020)

**Rs.**

Cash balance as on 1/01/2020	-	-	54,000
Additional to cash:			
Net Profit for the year	-	42,300	
Depreciation:			
Plant and Machinery	6,000		
Furniture and fixtures	3,000	9000	
Increase in outstanding expenses		900	
Reduction in debtors		18,000	
Increase in Creditors		3,600	
Issue of share capital		30,000	
Issue of depreciation		6,000	1,09,800
Cash available			1,63,800
Deductions from cash:			
Dividend paid		30,000	
Increase in stock		18,000	
Purchase of Land and Building		30,000	78,000
Cash Balance on 31/12/2020			85,800

**Illustration 2:**

Taking the information from above illustration I prepare cash budget showing cash at Bank on 31/12/2020 under projected Balance sheet method.

**Cash Budget**

**Projected Balance Sheet**

(As on 31/12/2020)

Liabilities	Rs	Assets	Rs.
Share Capital	1,80,000	Land & Building	1,20,000
Capital Reserve	15,000	Plant and Machinery	54,000
Profit and Loss A/c	39,300	Furniture and Fixtures	12,000
Debentures	36,000	Closing Stock	30,000
Creditors	90,000	Debtors	60,000
Outstanding Expenses	1,500	Bank (Balancing Figure)	85,800
	3,61,800		3,61,800

### Illustration 3:

A Company expects to have Rs. 3,75,000 cash in hand on 1<sup>st</sup> April 2020. Prepare a cash budget for three months April, May and June. The other particulars are:

Month(2020)	Sales (₹) Net	Purchases (₹) (Net)	Wages (₹)	Factory Expenses (₹)	Office Expenses (₹)	Selling Expenses (₹)
February	7,50,000	4,50,000	90,000	75,000	60,000	45,000
March	8,40,000	4,80,000	97,500	83,500	60,000	45,000
April	9,00,000	5,25,000	1,05,000	90,000	60,000	52,500
May	12,00,000	6,00,000	1,35,000	1,12,500	60,000	65,700
June	13,50,000	6,00,000	1,42,500	1,40,000	70,000	70,000

Other Information:-

- 1) Period of credit allowed by suppliers 2 months.
- 2) 20% of sales is for cash and period of credit allowed for credit is one month.
- 3) Delay in payment of all expenses – 1 Month.
- 4) Income tax of ₹5,75,000 is due to be paid on June 15<sup>th</sup>.
- 5) The company is to pay dividends to shareholders and bonus to workers of ₹1,50,000 and ₹2,25,000 respectively in the month of April.
- 6) Plant has been ordered to be received and paid in May. It will cost ₹12,00,000.

Prepare cash budget for April, May and June.

**Solution:**

Particulars	April (₹)	May (₹)	June (₹)
Opening Balance (Cash)	3,75,000	1,17,000	(-) 91,050
<b>Receipts From:</b>			
Cash Sales (20% of Sales)	1,80,000	2,40,000	2,70,000
Debtors (80% of previous month sale )	6,72,000	7,20,000	9,60,000
<b>Total (A)</b>	12,27,000	10,77,000	3,19,500
<b>Payments</b>			
Creditors (2 month from previous purchases)	4,50,000	4,80,000	5,25,000
Wages (previous month)	97,500	1,05,000	1,35,000
Factory Expenses (previous month)	82,500	98,000	1,12,500
Office Expenses (previous month)	60,000	60,000	60,000

Working Capital Decisions	Selling Expenses (previous month)	45,000	52,500	65,700
	Dividend to Share holders	1,50,000	-	-
	Bonus to Workers	2,25,000	-	-
	Purchase of Plants	-	12,00,000	-
	Income Tax	-	-	5,75,000
	<b>Total (B)</b>	11,10,000	19,87,500	14,73,200
	<b>(A-B)</b>	1,17,000	- 9,10,500	- 11,53,700

The company needs overdraft from bank in May and June to the extent of ` 9,10,500 and Rs. 11,53,700 respectively.

Note:-

- 1) Net Sales must be shown after discount and returns. Similarly net purchases after discount and return
- 2) A schedule of debtors may be prepared before cash budget.

## 18.8 PAYABLES CASH MANAGEMENT

Payables represent amount of cash that a firm owes to its vendors and creditors for the supply of raw materials. It represents a part of the short term liabilities of the firm. It relates to planning cash outflows carefully to facilitate longer credit periods from firm's creditors. The firm can then retain an adequate amount of money for carrying out the day-to-day business operations. The cash, if well managed, may be invested in profitable business opportunities to generate more income for the business. This in turn enhances business growth.

## 18.9 RECEIVABLES CASH MANAGEMENT

Receivables refer to debts owed to the business by its regular customers in lieu of sales in the course of business. A business must properly manage its receivables to facilitate adequate cash flow in the business. Businesses should ensure that they receive payments for their sales on time to avoid shortage of cash which may interfere with the normal business activities. Shorter credit periods should be allowed to customers to avoid bad debts which may put business's financial position at risk.

## 18.10 BENEFITS OF GOOD CASH MANAGEMENT

- a) **Facilitates Business Expansion:** Having swift cash flow management reduces reliance on external business resources such as commercial bank loans thus allowing rapid business expansion.
- b) **Building Business Image:** Good cash flow management helps business to settle its debts on time which in turn enhances trust between the firm, its suppliers and creditors.

- c) **Minimizes Business Stress:** Having good cash flow management facilitates smooth running of business operations. The management does not have to worry about how business obligations will be met.
- d) **Ensures Optimal Cash Flow:** A good cash management policy enables managers to have a better understanding of cash inflows and outflows as and when need arises.

## 18.11 OPTIMAL CASH BALANCE

A firm should maintain optimum cash balance to meet daily business expenses. It may also require additional cash as a buffer or safety stock. The amount of cash balance will depend on the risk-return trade off. Thus, the firm should maintain an optimum level i.e. just enough, i.e. neither too much nor too little cash balance. This, however, poses a question. How to determine the optimum cash balance if cash flows are predictable and if they are not predictable? Some models have been developed to estimate the level of optimal cash balance in a reliable manner which are explained as follows:

### 18.11.1 The Baumol Model

William Baumol developed a cash model to determine the optimum amount of transaction cash under conditions of certainty. This model was developed on the basis of Economic Ordering Quantity (EOQ) model of inventory management. As we shall learn ahead, EOQ represents the quantity of units that needs to be added to the business inventory to minimize the total cost incurred in maintaining and ordering inventory.

According to Baumol model, *optimum cash level is that level of cash where the carrying costs and transactions costs are the minimum.*

- The **carrying costs (or holding costs)** refer to the cost of holding cash, i.e., the interest foregone on marketable securities.
- The **transaction costs** refer to the cost (such as clerical, brokerage, registration and other costs) involved in getting the marketable securities converted into cash.

#### Assumptions

- The cash needs of the firm are known with certainty.
- The cash is used uniformly over a period of time and it is also known with certainty.
- The holding cost is known and it is constant.
- The transaction cost also remains constant

The optimum cash balance according to this model will be that point where these two costs are minimum. The formula to ascertain the level of optimal cash balance according this model is:

$$C = \sqrt{\frac{2A \times F}{o}}$$

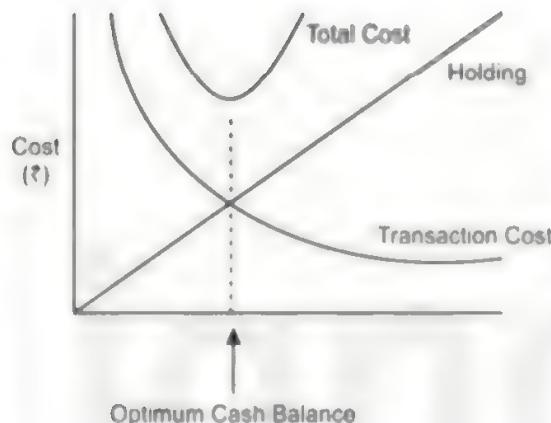
C = Optimum Balance

A = Annual Cash Distribution

F = Fixed Cost Per Transaction

O = Opportunity Cost of Holding

This can be explained with the following diagram:



Limitations of the Baumol Model:

- i) The model does not give full details on the cash flow transactions that are supposed to take place in the course of the business. It only gives an estimation which is not always certain.
- ii) The model does not consider bank overdrafts which is also an important short term source of business funds.
- iii) This model does not account for irregular variations in the cash flows.

**Illustration 4:** UPL Pvt. Ltd. has an annual total cash requirement of ₹12,60,000 per year. The company has an opportunity to buy a certificate of deposit with an annual fixed interest rate of 8%. The transaction cost is ₹20 per transaction. Calculate the optimal cash balance.

**Solution:**

$$C = \sqrt{\frac{2A \times F}{o}}$$

C = Optimum Balance

A = Annual Cash Distribution

F = Fixed Cost Per Transaction

O = Opportunity Cost of Holding

Here, A = ₹12,60,000

F = ₹ 20

O = 8 %

$$\text{The optimum cash balance } C = \sqrt{\frac{2 \times ₹12,60,000 \times ₹20}{0.08}} = ₹25,100$$

Thus, the optimal cash balance of ₹25,100 meets the minimum sum of opportunity cost and transaction cost.

### 18.11.2 The Miller-Orr Model

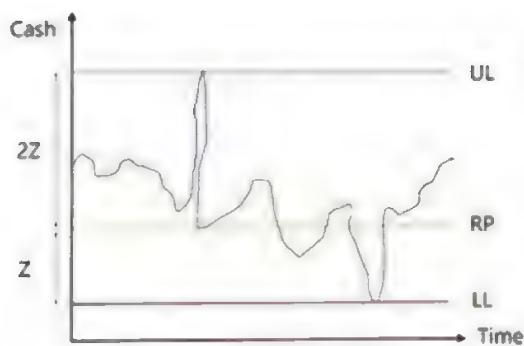
The model has been developed by two American Economists, Merton Miller and Daniel Orr. This model assumes that the net cash flow is completely stochastic. According to the model, withdrawing cash should be an option only when the funds available are below the return point of money which is determined by setting upper and lower cash balance limits in the business. The lower limit is the minimum balance of cash and the upper limit is the maximum cash balance needed to run a business. The lower limit is usually set by the cash manager which, however, depends on the credit worthiness of the business, the expected cash needs and the acceptable risk of the cash flow gap. According to Miller and Orr, a company needs to decide the sum of cash that needs to be maintained rather than ascertaining the withdrawal amount. They propounded that a company may have excess cash which can be used to make investments to generate more profit. This model works best for businesses with unsteady cash flows.

#### Assumptions

- The extra funds can be invested in profitable business opportunities.
- Cash flows are not always constant, that is, a business can have differing payables and receivables.
- Transaction fee is charged whenever funds are invested in marketable securities.

A business maintains an acceptable minimum balance of cash which is the lower limit.

Their idea has been demonstrated in the following graph:



In the above graph,

**UL i.e. Upper Limit** – It is the maximum amount of cash needed for a business to carry out its daily functions

**LL i.e. Lower Limit** It is the minimum level of business cash required to carry out business activities

**RP i.e. the return point of cash**

**Z i.e. the spread of cash**

The return point for the cash according to this model is calculated as follows:

$$\text{Return point (RP)} = \text{Lower Limit} + \frac{1}{3}(\text{Cash Spread})$$

**Check Your Progress A**

- 1) What are the motives for holding cash?

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- 2) What are the uses of short-term cash forecasts (budgets)?

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- 3) Explain the various objectives and the functions of management of cash.

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- 4) What is the difference between payables and receivables management?

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- 5) Describe different cash models.

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## 18.12 LET US SUM UP

Every firm must have minimum cash to run its day to day operations. Cash Management refers to management of cash and bank balance including short-term deposits. In a wider sense, it implies management of cash inflows and outflows. The primary goal of management of cash is to meet the cash outflows and minimize the opportunity cost of holding cash balance. There are various functions of cash management like estimation of required capital to run a business, allocation of funds, control over business funds, handling unexpected costs, initiating investments etc. Payables represent the amount of cash that a firm owes to its vendors and creditors for the supply of raw materials. It is a part of the short term liabilities of the firm. Receivable refers to debt owed to the business by its regular consumers for sales in the course of business. Good cash management facilitates business expansion, build business image, minimize business stress, ensure optimal cash flow and save time.

Management of cash requires a practical approach to help determine the amount of cash required and the time when it is required to meet daily business expenses. Important models to determine cash level in the business includes: ‘The Baumol Model’ and ‘The Miller-Orr Model’. ‘The Baumol Model’ emphasizes on maintaining an adequate balance to meet business obligations and to take advantage of the available business opportunities. According to ‘Miller-Orr model’, withdrawal of cash should be undertaken only when the fund available is below the return point of money. The returning point is determined by setting upper and lower cash balance limits in the business.

## 18.13 KEY WORDS

**Bank Overdraft:** It is a facility offered by a bank to its customer to withdraw a sum of money even when her bank balance is zero or to allow her to withdraw an amount higher than her available bank balance.

**Cash Inflow:** Money received by a firm as a result of its investment activities, operating activities or financing activities is called cash inflow.

**Cash Management:** Management of cash refers to a broad area of finance involving the collection, handling and usage of cash.

**Economic Ordering/Order Quantity:** Economic Ordering/Order Quantity represents the quantity of units that need to be added in business inventory to minimize the total cost incurred in inventory.

**Financial Management:** It means planning, organizing, directing and controlling the financial activities such as procurement and utilization of funds of a firm.

**Payables Cash Management:** The administration of a firm's outstanding debts or liabilities to vendors for purchases of goods and services on credit.

**Receivables Cash Management:** Accounts receivable management is about ensuring that customers make their payments on time.

**Transaction Cost:** Transaction costs are the costs incurred during trading, over and above the selling price of the goods.

**Transaction Fee:** It is an expense that an organisation must pay each time it processes an electronic payment for a consumer's transaction.

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## 18.14 SELF-ASSESSMENT QUESTIONS

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- 1) Explain the objectives and benefits of cash management
- 2) Distinguish between payables and receivables cash management.
- 3) Describe the Baumol's model of cash management.
- 4) Discuss Miller-Orr model of cash management to determine the cash balance of the firm.

**NOTE:** These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.

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# **UNIT 19 RECEIVABLES MANAGEMENT**

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## **Structure**

- 19.1 Objectives
  - 19.2 Introduction
  - 19.3 Credit Policy
  - 19.4 Factors Affecting the Size of Receivables
  - 19.5 Credit Evaluation
  - 19.6 Control of Account Receivables
  - 19.7 Costs Associated with Receivables Management
  - 19.8 Benefits of Receivables Management
  - 19.9 Cost Benefit Analysis
  - 19.10 Approaches to Evaluation of Credit Policies
  - 19.11 Concept of Factoring and Forfaiting
  - 19.12 Let Us Sum Up
  - 19.13 Key Words
  - 19.14 Self-Assessment Questions
- 

## **19.1 OBJECTIVES**

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After studying this unit, you should be able to:

- understand the concept of credit policy, its objectives and variables;
  - enumerate factors affecting the size of receivables;
  - describe the dimensions of management of receivables;
  - describe various costs associated with receivables management;
  - describe the benefits of receivables management;
  - discuss the approaches to evaluation of Credit Policies;
  - understand the concept of factoring and forfaiting; and
  - calculate receivables turnover ratio.
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## **19.2 INTRODUCTION**

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Receivables management describes the policies, techniques and procedures set by an organisation to facilitate the control of credit that it offers to its regular customers in the course of the business. It includes evaluating credit-worthiness of customers, establishing terms of credit and sales policies and planning for a suitable collection process of the receivables. Receivables are considered as the current assets of a company and are also shown in the company's balance sheet. Therefore, they should be translated into cash in a

short span of time to enable smooth running of business. A company that has poor efficiency in the management of receivables increases liquidity risk of the firm.

## 19.3 CREDIT POLICY

The term Credit Policy refers to the amount and terms of credit allowed by a firm to its customers. Credit policy is a set of parameters and principles that regulate trade credit offered to customers. It determines the amount of credit on sales of goods and services offered to regular customers in the course of business operations. Credit policies should be favorable to facilitate large volume of sales. However, the management should not adopt very lenient credit policies as this may cause bad debts to the company. Businesses should extend credit facilities after establishing the credit-worthiness of the customers. For effective management of receivables, a balanced credit policy is a must.

### Credit Policy Objectives

- 1) **Outlines Policies and Procedures:** Effective credit policy communicates customers with various options in case they are not able to pay in full.
- 2) **Provides Guidelines:** Trade Policy helps outline the guidelines for legally collecting the money from slow or non-paying customers
- 3) **Implements a Plan:** An appropriate credit policy plan helps business in determining reasonable credit limits to be offered to the customers.
- 4) **Outlines Steps:** In order to eliminate bad debt, credit policy helps in outlining procedure and steps to collect dues from late paying customers.

### Credit Policy Variables

A firm's Credit Policy consists of the following important Variables:

- 1) Credit Standards
- 2) Credit Period
- 3) Cash Discount
- 4) Collection Effort.

The above variables affect firm's sales volume, probability of losses due to bad debts, discounts availed by customers, and collection expenses. A firm should establish a receivables policy only after careful consideration of both pros and cons of different policies.

#### 1) Credit Standards

The term Credit Standard refers to the basic criteria for extending credit to the customers. A firm has a wide range of options available in deciding what Credit Standards should be adopted in accepting/rejecting an account for grant of credit. At one extreme, the firm may decide not to grant credit to any customer, irrespective of their credit rating. At the other end, it may decide to grant credit to all customers, however weak

their credit rating be. However, several other possibilities lie between these two extreme positions. The firm may decide to follow a lenient or stringent credit standards. In general, relaxed or liberal credit standards tend to attract more customers, thus increasing the level of sales of a firm. This is, however, accompanied by a higher possibility of bad debt loss, a larger investment in receivables, and a higher cost of collection. On the other hand, stringent or tightened credit standards have opposite effects. They tend to depress sales, reduce the probability of bad debt losses, decrease the investment in receivables, and lower the cost of collection.

## 2) Credit Period

The credit period refers to the length of time customers are allowed to pay for their purchases. It varies from firm to firm and industry to industry. The credit period is generally expressed in terms of net days. For example, if the credit terms offered by a firm are “net 50”, then it means that customers are expected to repay the credit obligations within 50 days. Extending the credit period tends to stimulate sales, but it increases the cost as more funds are tied up in receivables.

## 3) Cash Discount

Cash discounts are generally offered by the firms in order to induce customers to make prompt (early) payments. The percentage discount and the credit period are reflected in the credit terms. For example, credit terms of 3/10, net 50 mean that a discount of 3 percent is offered if the payment is made by the tenth day; otherwise, the customer is required to repay credit obligations within 50 days. A liberal cash discount policy would require increasing the discount percentage and/or the discount period which tends to enhance sales. Since customers tend to make prompt payments, this also helps in reducing the average collection period. On the other hand, a stringent cash discount policy would have opposite effects.

## 4) Collection Effort

The collection procedure of the firm may consist of the following activities:

- a) Monitoring state of receivables
- b) Dispatch of letters, E-mail or telephonic reminders to customers nearing due date
- c) Legal action against overdue accounts

A stringent collection programme tends to decrease sales, reduce the average collection period, reduce the probability of bad debts, and increase the overall collection expense. On the other hand, a relaxed collection programme would push sales up, increase the average collection period, increase the probability of bad debts, and reduce the collection expense.

## 19.4 FACTORS AFFECTING THE SIZE OF RECEIVABLES

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### 1) Credit Policy

It refers to the amount and terms of credit allowed by a firm to its customers. An organisation which has a very strict credit collection policy will have lower level of receivables. On the other hand, an organisation that has a liberal credit policy will have higher level of receivables.

### 2) Level of Sales

The volume of sales that a company wants to achieve affects the size of its receivables. If a company wishes to increase its volume of sales, it has to offer more credit to company's regular clients. This increases the receivables' size.

### 3) Terms of Trade Credit

Size of receivables also depends on the trade credit terms offered to the firm by its suppliers and vendors. If the terms are strict, the business may not offer much credit to its customers. This will in turn reduce the size of receivables in a company. On the other hand, if the terms of the credit are favorable, the firm may relax its credit collection policy to its customers thus increasing account receivables.

## 19.5 CREDIT EVALUATION

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Once the credit policy is formulated, next step is to execute it. For the execution, the firm has to evaluate the credit applicants. To evaluate the credit applicant, it is important to check the credit pattern of the applicant. This means evaluating the borrowing capacity and repaying ability of the applicants with regard to credit terms of the company. In credit evaluation, customers are evaluated in terms of 5 C's. These are character, capacity, collateral, capital and conditions.

**Character:** It is reflected by customers credit history.

**Capacity:** It is customers debt to income ratio, i.e. customers ability to pay.

**Collateral:** The asset that can act as security for loan, i.e. the security that a customer can pledge. It gives the seller the assurance. If the borrower defaults on loan, the seller can get something back by repossessing the collateral.

**Capital:** Capital is the financial reserve of the business. In the context of credit evaluation, the first focus of the lenders to assess is the ability of the firm to meet its credit obligation from the operating cash flows. In case if the assessment of lender finds problems in meeting debt obligations from cash flows, then the focus shifts to the adequacy of capital. In the initial years of the operation firms may not have sufficient operational cash flows

but may have adequate capital cover to cushion the shortfall, in that case lenders may advance the credit to the firm.

**Condition:** It is the details of any credit transactions like principal amount or credit interest. Risk assessment is done by lenders based on how borrower use the once they receive it. The external factors such as industry special laws, political changes and governmental interest rates are also taken into account. In addition to this, the firm collects the information from various sources such as banks, other firms, credit agencies, and financial statements.

Once the credit evaluation and investigation is complete, the firm should take decision regarding whether to grant the credit or not. The customers may be old and new. So based on the evaluation high credit worthy may be granted loan and in case of medium credit worthy customer, the potential loss may be compared whereas low credit worthy customer may be refused credit.

It is also necessary for the firm to compare the cost of good and revenue from sale. The present value of revenue from sale to customer who have been granted credit should be compared will cost of goods sold plus cost of investigation.

e.g. A firm has incremental cash flow of Rs. 5,000 as a result of change in credit policy. The required rate of return is 10%. The cost of producing additional units due to increase in credit sales of Rs. 30,000 is Rs. 10,000. The NPV will be :

$$NPV = P.V. \text{ of benefits} - \text{Cost}$$

$$NPV = (5000/10) (30,000 + 10,000)$$

$$NPV = 50,000 - 40,000$$

$$NPV = \text{Rs. } 10,000$$

NPV here is positive, so credit policy can be followed.

## **19.6 CONTROL OF ACCOUNT RECEIVABLES**

Once the firm has granted credit to the customers, then it is imperative for a firm to swiftly exercise control on its accounts receivables in order to thrive and grow. Effective control of receivables entails:

### **A) Monitoring of Receivables**

- i) Determining Daily Sales Outstanding (DSO): DSO figure refers to the number of days a business takes to collect its payments at the end of the sales.

$$DSO = (\text{Average Accounts Receivables} / \text{Total Credit Sales}) \\ \times \text{No. of days}$$

**OR** it can be computed as  $= \frac{\text{Accounts Receivables} \times \text{No. of days}}{\text{Net Credit Sales}}$

If the DSO is low, it indicates that firm takes a few days to collect receivables whereas if it is high it means that the firm takes more days to collect receivables. A high DSO may create cash problem in long-run. DSO is important to measure the liquidity of the firm. It is always good for the firm to collect the receivable at the earliest.

**Illustration1:**

Inox Ltd. had gross credit sales of Rs. 25,00,000 in a year. It had sales returns of Rs. 5,00,000. It had accounts receivables of Rs. 3,00,000. Find out the Days Sales Outstanding (DSO).

**Solution:**

Given, Accounts Receivables = Rs. 3,00,000

$$\text{Net Credit Sales} = \text{Gross Credit Sales} - \text{Sales Returns}$$

$$= \text{Rs. } 25,00,000 - \text{Rs. } 5,00,000$$

$$= \text{Rs. } 20,00,000$$

Now, calculate DSO using the formula below,

Daily Sales Outstanding = (Average Accounts Receivables / Total Credit Sales) × No. of days

$$\text{DSO} = (3,00,000 / 20,00,000) \times 365$$

$$= 54.75 \text{ days}$$

This shows it takes 54.75 days for Inox Ltd. to collect money from its debtors on average.

- **Analysis of Receivables:** Receivables analysis includes evaluation of accounts of debtors in terms of proportions, where each proportion represents a certain value which is classified as bigger, moderate and smaller values. Proper analysis of receivables reduces the risk of bad debts.
- **Ageing Schedule of Receivables:** The outstanding receivables is classified into age groups (here, age is the time period for which it has remained unpaid) and states the amount due for each age group as a percentage of total receivables due. The quality of a receivable is directly linked to the age. Older receivables have a higher likelihood of default. An ageing schedule warns the management regarding the inefficiency in collection of receivables. It also points out to the areas requiring corrective action.

Age Group (Number of Days)	% of Total Outstanding Receivables	Receivables Management
Less than 30 days	60%	
31-45 days	20%	
46-60 days	10%	
61 and above	10%	

It may be noted that, the firm has a credit period of 30 days and 60% of the total receivables are less than 30 days old. 20% of the receivables are overdue by 15 days, 10% are over due by 30 days and 10% are overdue by more than 30 days. This type of ageing schedule can provide a kind of an early warning suggesting i) deterioration of receivables quality, and ii) where to emphasize the appropriate corrective actions.

- B) Credit Limit :** It refers to the maximum amount of a particular customer may have as due to the firm at any time. Different customers may be allowed different credit limit. Customers unpaid balance should be within this maximum limit. Credit limit must be reviewed periodically for all the customers. They may or may not be charged by the firm.
- C) Accounting Ratios:** There are many ratios that may be calculated to control the receivables. However, two ratios: (a) Receivable Turn-over ratios and (b) Average Collection Period on the important ratios to control and monitor receivables. These ratios should be calculated continuously and compared with the industry ratios or same firm. A less ratio as against industry or firm if compared indicates an immediate action towards credit policy.

## Receivables Turnover Ratio

It is an efficiency ratio that shows the relation between yearly credit sales and average level of receivables. The ratio estimates the efficiency and effectiveness of a firm in management of its receivables.

Average Collection Period = 365 days/Accounts Receivable Turnover Ratio

**OR**

Average Accounts Receivables per day/Average Credit Sales per day

Receivables Turnover Ratio is calculated as follows:

$$\text{Accounts Receivable Turnover} = \frac{\text{Net Credit Sales}}{\text{Average Accounts Receivable}}$$

**OR**

$$\frac{\text{Net Sales}}{\text{Average Accounts Receivables}}$$

### Illustration 2:

In the year 2020, a firm has a gross credit sale of INR 20,00,000 and INR 6,00,000 returns. On the 1<sup>st</sup> of January, 2020, the amount of account receivables was INR 6,00,000 and that of 31<sup>st</sup> December, 2020 was INR 8,00,000. Calculate the Accounts Receivable Turnover Ratio.

#### Solution:

First of all we shall identify the average accounts receivable by adding the receivables in January and receivables in December then dividing the value by 2.

$$\text{Average Accounts Receivable} = 6,00,000 + 8,00,000$$

$$= 14,00,000$$

$$= 14,00,000/2$$

$$= \text{INR } 7,00,000$$

$$\text{Net credit sales} = \text{Gross Credit Sales} - \text{Returns}$$

$$= 20,00,000 - 6,00,000$$

$$= \text{INR } 14,00,000$$

Now we determine the account receivable turnover ratio

$$= 14,00,000/7,00,000 = 2$$

#### Check Your Progress A

- 1) Explain the factors affecting size of receivables?

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- 2) What are the dimensions of receivables management?

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## 19.7 COSTS ASSOCIATED WITH RECEIVABLES MANAGEMENT

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There are several costs associated with the receivables. These are as follows:

- a) **Capital Costs:** Capital costs in receivables management refer to the costs incurred while arranging for additional funds to support credit or finance the funds blocked in receivables. A company needs to access funds from other sources in order to support the credit it offers.
- b) **Administrative Costs:** Administrative costs are incurred in maintaining the credit records and in collection of dues from customers. The costs

include salaries for the staff, cost of phone calls taking places in various offices, cost of collecting cheques, cost of office equipment, accounting and recording costs.

- c) **Delinquency Costs:** These are costs incurred in the process of collection of amount due from customers. These costs are incurred in continuously reminding customers of their debts and legal charges on defaulting customers.
- d) **Defaulting Costs:** A company may not be able to collect the total amount due from customers because they may be unable to settle their debts. This amount is called as bad debt. Higher bad debts reduce profitability of the business.

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## 19.8 BENEFITS OF RECEIVABLES MANAGEMENT

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- **Profit Generation:** Effective management of receivables leads to increase in profits. It is a consequence of larger volume of sales which results from favorable credit terms offered to regular customers.
- **Attraction and Retention of New Customers:** A company that offers credit and manages its receivables efficiently stands a higher chance of attracting new customers and retaining its regular customers than ones with less efficiency in the management of receivables.
- **Improves Investments:** Receivables management enables a business to invest in more profitable opportunities which further encourages sales.
- **Increases Production:** Effective management of receivables increases the rate of production as more ‘working capital’ is available for operations and less ‘working capital’ is tied up in accounts receivables.
- **Effective Financial Planning and Control:** A sound management of receivables enables the management to achieve effective financial planning and control.
- **Deal effectively with Competition:** Regulating the amount of credit offered to customers enables a business to survive in a highly competitive environment.
- **Minimize Bad Debts:** Management of receivables helps a company to minimize bad debts associated with inadequate or lack of receivables management.

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## 19.9 COST BENEFIT ANALYSIS

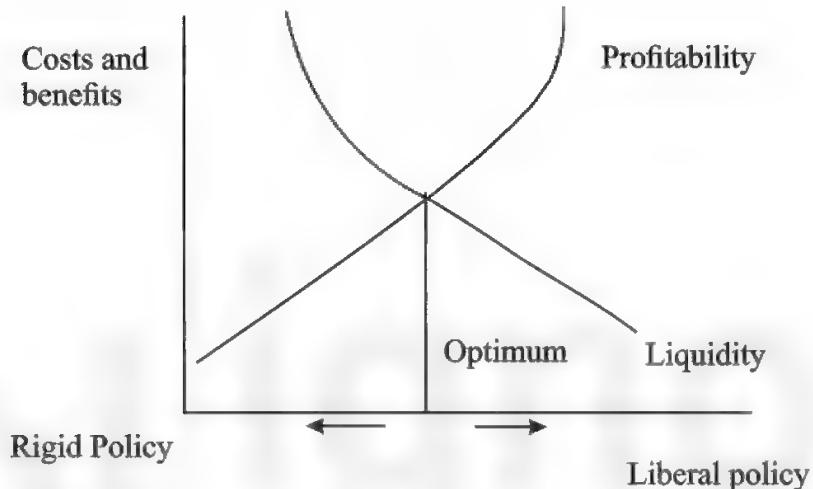
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The credit policy includes costs as well as benefits and it has an effect on the volume of sales and profits of the firm. To have an optimum credit policy there should be a trade-off between costs and profits. As you know that optimum credit policy always maximizes the value of the firm. An optimum credit policy does not always mean that a maximum operating profit is desired. It actually is the incremental rate of return of an investment which is

equal to the incremental cost of capital. This is known as ‘Marginal Cost of Capital’.

If a firm adopts liberal credit policy, though the profit may increase but is risky as the payment of customers is for an extended period which may result into the cost of default on part of customers. As a result, cost of collection also increases.

A liberal credit policy results in increase profitability of the firm but decreases the liquidity of the firm and vice-versa. The following figure shows how credit policy affects the profitability and liquidity of the firm.



### **Check Your Progress B**

- 1) Describe different costs associated with receivables management.

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- 2) Enlist the advantages of receivables management.

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## **19.10 APPROACHES TO EVALUATION OF CREDIT POLICIES**

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There are basically two methods of evaluating the credit policies to be adopted by a company Total Approach and Incremental Approach.

The formats for the two approaches are given as under:

## Statement showing the Evaluation of Credit Policies (based on Total Approach)

Receivables Management

Particulars	Present Policy days	Proposed Policy I days	Proposed Policy II days	Proposed Policy III days
	INR	INR	INR	INR
<b>A. Expected Profit:</b>				
(a) Credit Sales	.....	.....	.....	.....
(b) Total Cost other than Bad Debts	.....	.....	.....	.....
(b) Less: Incremental Costs of Credit Sales				
(i) Variable Costs	.....	.....	.....	.....
(ii) Fixed Costs	.....	.....	.....	.....
(c) Bad Debts	.....	.....	.....	.....
(d) Cash Discount	.....	.....	.....	.....
(e) Expected Net Profit before Tax (a-b-c-d)	.....	.....	.....	.....
(f) Less: Tax	.....	.....	.....	.....
(g) Expected Profit after Tax	.....	.....	.....	.....
<b>B. Opportunity Cost of Investments in Receivables locked up in Collection Period</b>				
Lock-up Period	.....	.....	.....	.....
<b>Net Benefits (A – B)</b>	.....	.....	.....	.....

**Advise:** The Company should adopt that policy in which the net benefits are higher as compared to other policies.

**Here**

- Total Fixed Cost (TFC) = [Average Cost per unit (AC/unit) – Variable Cost per unit (VC/unit)] × No. of units sold on credit under Present Policy
- Opportunity Cost = Total Cost of Credit Sales × (Collection period [Days] / 365 [or 360]) × (Required Rate of Return / 100)

## Statement showing the Evaluation of Credit Policies (based on Incremental Approach)

Particulars	Present Policy days	Proposed Policy I days	Proposed Policy II days	Proposed Policy III days
	INR	INR	INR	INR
<b>A. Incremental Expected Profit:</b>				
Credit Sales	.....	.....	.....	.....
(a) Incremental Credit Sales	.....	.....	.....	.....
(b) Less: Incremental Costs of Credit Sales				
(i) Variable Costs	.....	.....	.....	.....
(ii) Fixed Costs	.....	.....	.....	.....
(c) Incremental Bad Debt Losses	.....	.....	.....	.....
(d) Incremental Cash Discount	.....	.....	.....	.....
(e) Incremental Expected Profit (a-b-c-d)	.....	.....	.....	.....
(f) Less: Tax	.....	.....	.....	.....
(g) Incremental Expected Profit after Tax	.....	.....	.....	.....
	.....	.....	.....	.....
<b>B. Required Return on Incremental Investments:</b>				
(a) Cost of Credit Sales	.....	.....	.....	.....
(b) Collection Period (in days)	.....	.....	.....	.....
(c) Investment in Receivable (a × b/365 or 360)	.....	.....	.....	.....
(d) Incremental Investment in Receivables	.....	.....	.....	.....
(e) Required Rate of Return (in %)	.....	.....	.....	.....
(f) Required Return on Incremental Investments (d × e)	.....	.....	.....	.....
<b>Incremental Net Benefits (A – B)</b>	.....	.....	.....	.....

**Advise:** The Company should adopt that policy in which the net benefits are higher as compared to other policies.

### Here

- i) Total Fixed Cost (TFC) = [Average Cost per unit (AC/unit) - Variable Cost per unit (VC/unit)] × No. of units sold on credit under Present Policy
- ii) Opportunity Cost = Total Cost of Credit Sales × (Collection period [Days] / 365 [or 360]) × (Required Rate of Return / 100)

### Illustration 4

A merchandiser reports the current sales of ₹ 8 lakhs per annum from the African region with an average collection period of 20 days.

Following is the data revealed by the expert:

Credit Policy	Increase in Collection Period	Increase in Sales	Present Default Anticipated
A	20 days	₹ 20,000	1.25%
B	30 days	₹ 45,000	2.5%
C	40 days	₹ 60,000	3.25%

Further, the following information is provided:

- i) Current Bad Debt Loss is 1%
- ii) Selling Price per unit is ₹ 5
- iii) Variable Cost per unit is ₹ 2
- iv) Average Cost per unit is ₹ 2.5
- v) Required Return on Additional Investment is 30%

Assuming a 360 days year, analyze which of the above policies shall be recommended?

### Solution:

#### A) Statement showing the Evaluation of Credits Policies (Total Approach)

Particulars		Present Policy 20 Days	Proposed Policy A 40 Days	Proposed Policy B 50 Days	Proposed Policy C 60 Days
A.	Expected Profit:	,	,	,	,
	(a) Credit Sales	8,00,000	8,20,000	8,45,000	8,60,000
	(b) Total Cost other than Bad Debts				

	(i) Variable Cost [Sales X 2/5]	320000	328000	338000	344000	Receivables Management
	(ii) Fixed Costs	80,000	80,000	80,000	80,000	
		4,00,000	4,08,000	4,18,000	4,24,000	
	(c) Bad Debts	8000	10250	21125	30100	
	(d) Expected Profit [(a) - (b) - (c)]	<b>3,92,000</b>	<b>4,01,750</b>	<b>4,05,875</b>	<b>4,05,900</b>	
<b>B.</b>	<b>Opportunity Cost of Investment in Receivables</b>	<b>6667</b>	<b>13600</b>	<b>17417</b>	<b>21200</b>	
<b>C.</b>	<b>Net Benefits (A - B)</b>	<b>3,85,333</b>	<b>3,88,150</b>	<b>3,88,458</b>	<b>3,84,700</b>	

**Recommendation:** The Proposed Policy B (i.e. increase in collection period by 30 days or total 50 days) should be adopted since net benefits under this policy is highest among other options.

#### Working Notes:

i) **Calculation of Fixed Cost =** [Average Cost per unit – Variable Cost per unit] X (Number of Units Sold)  

$$= [2.5 - 2.0] \times (8,00,000/5)$$
  

$$= 0.5 \times 1,60,000 = ₹ 80,000$$

ii) **Calculation of Opportunity Cost of Average Investments:**

iii) Opportunity Cost = Total Cost X (Collection Period/360) X (Rate of Return/100)

$$\text{Present Policy} = 4,00,000 \times (20/360) \times (30/100) = ₹6667$$

$$\text{Proposed Policy A} = 4,08,000 \times (40/360) \times (30/100) = ₹13,600$$

$$\text{Proposed Policy B} = 4,18,000 \times (50/360) \times (30/100) = ₹17,417$$

$$\text{Proposed Policy C} = 4,24,000 \times (60/360) \times (30/100) = ₹21,200$$

**B) Statement showing the Evaluation of Credit Policies (Incremental Approach)**

<b>Particulars</b>		<b>Present Policy 20 Days</b>	<b>Proposed Policy A 40 Days</b>	<b>Proposed Policy B 50 Days</b>	<b>Proposed Policy C 60 Days</b>
<b>A.</b>	<b>Incremental Expected Profit:</b>	'	'	'	'
	(a) Incremental Credit Sales	----	20,000	45,000	60,000
	(b) Incremental Cost				

	(i) Variable Cost	----	8000	18000	24000
	(ii) Fixed Costs	----			
		----	8,000	18,000	24,000
	(c) Incremental Bad Debts	----	2,250	13,125	22,100
	<b>(d) Incremental Expected Profit [(a) - (b) - (c)]</b>	----	<b>9,750</b>	<b>13,875</b>	<b>13,900</b>
<b>B.</b>	<b>Required Return on Incremental Investments:</b>				
	(a) Cost of Credit Sales	4,00,000	4,08,000	4,18,000	4,24,000
	(b) Collection Period	20	40	50	60
	(c) Investment in Receivable (a X b/360)	22222	45333	58056	70667
	(d) Incremental Investment in Receivables	----	23111	35833	48444
	(e) Required Rate of Return (%)	----	30	30	30
	<b>(f) Required Return on Incremental Investments (d X e)</b>	----	<b>6933</b>	<b>10750</b>	<b>14533</b>
<b>C.</b>	<b>Net Benefits (A - B)</b>	----	<b>2,817</b>	<b>3,125</b>	<b>-633</b>

Recommendation: Policy B should be adopted since net benefits under Policy B is highest among other policies.

#### Working Notes:

(i)	Calculation of Incremental Variable Cost =	(Variable Cost in New Collection Period) – (Variable Cost in 20 days Collection Period)
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$$\text{Proposed Policy A} = 3,28,000 - 3,20,000 = ₹8,000$$

$$\text{Proposed Policy B} = 3,38,000 - 3,20,000 = ₹18,000$$

$$\text{Proposed Policy C} = 3,44,000 - 3,20,000 = ₹24,000$$

(ii)	Calculation of Incremental Bad Debts =	(Bad Debts in New Collection Period) – (Bad Debts in 20 days Collection Period)
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Proposed Policy A =  $10,250 - 8000 = ₹2,250$

Proposed Policy B =  $21,125 - 8000 = ₹13,125$

Proposed Policy C =  $30,100 - 8000 = ₹22,100$

(iii)	Calculation of Investment in Receivables =	Cost of Credit Sales X (Collection Period/360)
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Present Policy =  $4,00,000 \times (20/360) = ₹22,222$

Proposed Policy A =  $4,08,000 \times (40/360) = ₹45,333$

Proposed Policy B =  $4,18,000 \times (50/360) = ₹58,056$

Proposed Policy C =  $4,24,000 \times (60/360) = ₹70,667$

(iv)	Calculation of Incremental Investment in Receivables =	Investment in Receivables in New Collection Period) – (Investment in Receivables in 20 days Collection Period)
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Proposed Policy A =  $45,333 - 22,222 = ₹23,111$

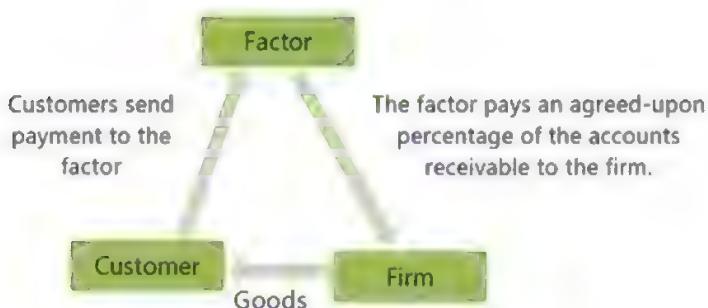
Proposed Policy B =  $58,056 - 22,222 = ₹35,833$

Proposed Policy C =  $70,667 - 22,222 = ₹48,444$

## 19.11 CONCEPT OF FACTORING AND FORFAITING

### 19.11.1 Factoring:

Factoring is a new concept in the area of financing of accounts receivables which refers to outright sale of accounts receivables to a factor or a financial agency. A factor is a firm that acquires the receivables of other firm(s). The factoring lays down the conditions of the sale in a factoring agreement. The factoring agency bears the risk of collection and services the accounts for a fee.



**Factoring arrangement can be either on a recourse basis or on a non-recourse basis:**

- **Recourse:** In case factor is unable to collect the amount from receivables then, factor can turn back the same to the organization for resolution (which generally is by replacing those receivables with new receivables)

- **Non-Recourse:** The factor bears the ultimate risk of loss in case of default and hence in such cases they charge higher commission.

A large number of financial institutions like commercial banks and other financial agencies are currently involved in providing factoring services in India. The biggest advantages of factoring are the immediate conversion of receivables into cash and predicted pattern of cash flows. Financing receivables with the help of factoring can help a company having liquidity without creating a net liability on its financial condition and hence no impact on debt equity ratio. Besides, factoring is a flexible financial tool providing timely funds, efficient record keepings and effective management of the collection process. This is not considered as a loan. There is no debt repayment and hence no compromise to balance sheet, no long-term agreements or delays associated with other methods of raising capital. Factoring allows the firm to use cash for the growth needs of business.

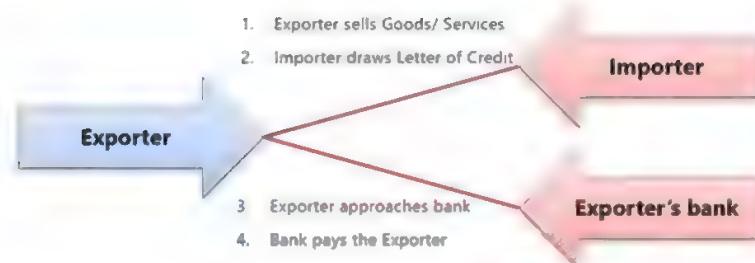
### 19.11.2 Forfaiting

'Forfait' is a French term meaning "relinquish a right". Forfaiting is an arrangement of bill discounting in which a financial institution or bank buys the trade bills (invoices) or trade receivables from exporters of goods or services, where the exporter relinquish his right to receive payment from importer. Financial Institutions or banks provides immediate finance to exporter 'without recourse' basis in which risk and rewards related with the bills/ receivables transferred to the financial institutions/ banks. It is a unique credit facility arrangement where an overseas buyer (importer) can open a "letter of credit" (or other negotiable instruments) in favour of the exporter and can import goods and services on deferred payment terms.

#### Functions of Forfaiting

The functionality can be understood in the following manner:

- i) Exporter sells goods or services to an overseas buyer.
- ii) The overseas buyers i.e. the importer on the basis trade bills and import documents draws a letter of credit (or other negotiable instruments) through its bank (known as importer's bank).
- iii) The exporter on receiving the letter of credit (or other negotiable instruments) approaches to its bank (known as exporter's bank).
- iv) The exporter's bank buys the letter of credit (or other negotiable instruments) 'without recourse basis' and provides the exporter the payment for the bill.



## Features of Forfaiting

- It motivates exporters to explore new geographies as payment is assured.
- An overseas buyer (importer) can import goods and services on deferred payment terms.
- The exporter enjoys reduced transaction costs and complexities of international trade transactions.
- The exporter gets to compete in the international market and can continue to put his working capital to good use to scale up operations.

While importers avail of forfaiting facility from international financial institutions in order to finance their imports at competitive rates.

## Check Your Progress C

- 1) Explain the concept of factoring. Also differentiate between factoring arrangement on Recourse and Non-Recourse basis.

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- 2) Enlist the various features of forfaiting.

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## 19.12 LET US SUM UP

Receivables Management describes the policies, techniques and procedures set by an organisation to help in facilitating the control of credit it offers to its regular customers in the course of the business. The objective of management of accounts receivable is to ensure that goods that are sold on credit basis are paid for by consumers as and when due. Inefficient managing of accounts receivable has taken many business entities out of business or forced their liquidation. There are various factors affecting size of receivables like credit policy of the company, level of sales, terms of credit trade, nature and condition of the business etc. The costs associated with receivables management are: i) capital cost ii) administrative costs iii) delinquency costs and iv) defaulting costs. Proper and efficient receivables management helps in profit generation, attracting new customers and retaining the existing ones, improves return on investments, increases production, facilitates effective

financial planning, control and coordination and helps in minimizing bad debts.

‘Receivables turnover ratio’ is a measure used to quantify a firm's effectiveness in the collections of its receivables or money owed by clients. The ratio shows how well a firm utilizes and manages the credit it extends to its customers and how speedily that short-term debt is being collected or paid. Accounts receivable turnover ratio is calculated when the net credit sales is divided by the average accounts receivable.

## 19.13 KEYWORDS

**Administrative Costs:** The cost incurred in controlling and directing an organisation, but not directly identifiable with marketing, financing or production operations.

**Ageing Schedule:** It is a summarized representation of accounts receivable into distinct time brackets in which rank of receivables is given based upon the days until due or the days past due.

**Average Accounts Receivable:** When the sum of beginning and ending accounts receivable over a time period (such as monthly/quarterly) is divided by two, we get average accounts receivable.

**Bad Debt:** Bad debt is an expense that a firm incurs once the repayment of credit earlier extended to a customer is projected to be uncollectible.

**Capital Costs:** ‘Capital costs’ are fixed, one-time expenses incurred on the purchase of land, buildings, construction, and equipment used in the production of goods or in the rendering of services.

**Defaulting Costs:** Defaulting cost is incurred due to the failure to repay a debt including interest or loan principal or security.

**Daily Sales Outstanding:** DSO is the average days that receivables remain outstanding before they are collected.

**Financial Planning and Control:** Financial planning and control is defined as a combination of strategies that support the entire financial management process of an organisation.

**Net Credit Sales:** Net credit sales are the sales generated by a firm through the extension of credit to consumers less all off-setting returns and discounts.

**Receivable Management:** Management of receivables refers to the process of taking decisions relating to investment in trade debtors.

**Receivable Turnover Ratio:** ‘Receivables Turnover Ratio’ is an efficiency ratio that indicates the relation between the yearly credit sales and average receivables.

## **19.13 SELF-ASSESSMENT QUESTIONS**

**Receivables  
Management**

- 1) What are the dimensions to be considered while planning for receivables management?
- 2) Write a short paragraph explaining receivables turnover ratio.
- 3) State the role which receivables play in the overall financial picture of the firm.
- 4) Explain the concepts of factoring and forfaiting.
- 5) What are the different methods to control account receivables?

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

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## **UNIT 20 INVENTORY MANAGEMENT**

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### **Structure**

- 20.1 Objectives
- 20.2 Introduction
- 20.3 Types of Inventory
- 20.4 Need for Holding Inventory
- 20.5 Factors Influencing Inventory Management
- 20.6 Benefits of Inventory Management
- 20.7 Costs involved in Inventory Management
  - 20.7.1 Ordering Costs
  - 20.7.2 Carrying Cost/ Inventory Holding Costs
  - 20.7.3 Cost of Stock-outs/ Shortage costs
- 20.8 Inventory Management Techniques
  - 20.8.1 ABC Inventory Management
  - 20.8.2 The EOQ Model
  - 20.8.3 Reorder Point
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### **20.1 OBJECTIVES**

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After studying this unit, you should be able to:

- explain types of inventory;
- understand the need for holding inventory;
- enumerate factors influencing inventory management;
- explain importance of inventory management;
- differentiate various costs involved in inventory management;
- describe inventory management techniques;
- understand the graphical representation of EOQ model; and
- explain inventory turnover ratio.

Inventory management is a significant part of working capital management for every organisation as it determines stability of supply chain as well as the financial health of an organisation. All firms strive to maintain adequate level of inventory that can meet its day to day requirements and try to avoid excess inventory that could lead to spoilage and other losses. Effective inventory management would ultimately result in maximization of the owner's wealth, which is in line with overall objective of financial management.

## 20.3 TYPES OF INVENTORY

- 1) **'Raw Materials' Inventory:** It comprises of the materials and items used by a company to produce goods for sale. They are the basic materials that a manufacturing firm purchases from its suppliers. They are then used by the firm to transform into final goods by adopting a set of manufacturing processes.
- 2) **'Work-in-Progress' Inventory:** 'Work-in-progress' also called as semi-finished goods, are the raw materials that are in the process of transformation into the final products.
- 3) **'Finished Goods' Inventory:** 'Finished goods' are the ultimate products obtained after the application of the conversion processes on the raw materials and the semi-finished goods. They are the final goods to be sold and their sale contributes fully to the revenue from the core operations of the organisation.

## 20.4 NEED FOR HOLDING INVENTORY

Although holding inventories involves a variety of costs such as carrying costs, ordering costs, shortage costs, etc., still a business can't survive without maintaining an adequate level of inventory. The primary reasons for holding inventory include:

### i) The Transactions motive:

The transaction motive expresses the need for holding sufficient inventory in order to facilitate production and sales operation smoothly. The various factors such as market demand, production capacity, average lead time, ordering cost, shortage cost, carrying cost, etc. needs to be considered while deciding the level of inventories to be maintained.

### ii) The Precautionary motive:

Market demand and supplies are generally cyclical and seasonal in nature depending upon various factors like seasons, festivals, strike, shutdown, crisis, transport bottlenecks etc. Accordingly, companies stock up raw materials and hold inventories in order to be able to meet unexpected spikes in demand. Thus, holding inventories acts as a safeguard against the risk of unpredictable change in demand and supply forces.

iii) **The Speculative motive:**

Holding of inventories for speculative purposes influences the decision to increase or reduce inventory levels in order to take advantages of price fluctuations. For example, if the price of a particular raw material is expected to go up steeply, an enterprise may decide to hold a larger than necessary stock of that item i.e. acquire prior to escalation.

iv) **Other Motives:**

Some other motives for holding inventory are:

- To take advantage of quantity discount and price discount while purchasing materials in bulk.
- To reduce ordering and carrying costs.
- To minimize transit cost and transit times.

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## 20.5 FACTORS INFLUENCING INVENTORY MANAGEMENT

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- a) **Economic Stability:** Unstable economy results into high costs of purchasing inventory. This situation can stress the management if it persists for a long period of time.
- b) **Availability of Working Capital:** Adequate working capital makes it easier to manage the inventory. Alternatively, inadequate working capital might bring down the management efficiency as a result of less finance to fund the cost of inventory.
- c) **Suppliers:** Suppliers can have influence on the control of inventory. This is because suppliers impact production rates of a company. It is important to find reliable suppliers to ensure steady supply of business inventory and avoid shortages.
- d) **Lead Time:** Lead time describes the length of time a product takes from the time it is ordered to the point of time it finally arrives. Lead time, however, varies widely subject to the type of product and manufacturing processes involved in producing the final product. Longer lead time affects inventory management negatively since it makes controlling production rates difficult.
- e) **Type of Product:** Inventory management must consider the type of products in the inventory. For instance, some products are more perishable than others so they may have different expiry dates. It is important to ensure that these products are rotated in line with their expiration dates.

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## 20.6 BENEFITS OF INVENTORY MANAGEMENT

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- a) **Level of Stock:** Effective Management of inventory helps to eliminate overstocking, shortages and stock obsolescence. Inventory management

aids the managers to find an equilibrium between carrying excessive and insufficient inventory.

- b) **Ease of Access:** Tracking of inventory helps in identifying items that are utilized most frequently. By organizing warehouse on the basis of usage frequency, the time spent retrieving these items will be minimized and is readily accessible.
- c) **Improved Efficiency:** Inventory management systems help in eliminating many time consuming and error producing processes associated with manual systems. Software systems can help make the entire inventory system more efficient and reduce errors.
- d) **Lower Costs:** Effective and efficient inventory management practices result in decreasing inventory write-offs and lowering inventory holding costs. Carrying additional inventory is generally costly for an organisation.
- e) **Better Inventory Turnover:** The longer an item is stored in the warehouse, the greater the chances of its obsolescence. A managed system will identify items that no longer need to be carried as well as additional items that should be added to the inventory.

### Check Your Progress A

- 1) What are different types of inventory? Give examples.

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- 2) List the factors that should to be kept in mind while managing inventory

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- 3) What is speculative motive?

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## 20.7 COSTS INVOLVED IN INVENTORY MANAGEMENT

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### 20.7.1 Ordering Costs

'Ordering costs' are costs incurred when a company orders inventory from suppliers. It comprises of transportation costs, receiving costs, cost of finding suppliers and expending orders, clerical costs of preparing purchase orders, costs of electronic data interchange.

### 20.7.2 Carrying Cost/ Inventory Holding Costs

These are costs incurred in storing inventory before they are sold to potential customers. Carrying cost includes inventory risk costs, opportunity cost, inventory financing costs etc.

### 20.7.3 Cost of Stock-outs/ Shortage costs

These are incurred whenever a company falls short of stock of inventory for any reason. They include:

- Costs of emergency shipments
- Loss of customer's loyalty and goodwill
- Disrupted production

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## 20.8 INVENTORY MANAGEMENT TECHNIQUES

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The decision making related to investment in inventory involves a basic risk and return trade-off. The risk is that if the inventory level is too low, the various functions of the firm do not operate efficiently. The lower level of inventory saves money which yields returns to the business. However, as the level of inventory rises, the storage and other costs also rise. At higher levels of inventory, the risk of running out of inventory decreases but the cost of carrying the inventory increases. Thus, the goal of managing inventory is to maintain the inventory at optimal level at minimum costs. Various techniques for inventory management are:

### 20.8.1 ABC Inventory Management

This technique involves classifying items into categories in the order of their relevance in the production process. Managers have finite energy and time. Thus, their efforts must be rationed according to the importance of task. In inventory management, it implies that more valuable items of inventory should be prioritized over less valuable items. 'A' denotes the most valuable raw materials, 'B' being moderate and 'C' being the least valuable products in the inventory. This enables a company to give more attention to the most valuable products. For instance:

- A items: ‘20% items’ accounts for ‘70% annual consumption value’ of items.
- B items: ‘30% items’ accounts for ‘25% annual consumption value’ of items.
- C items: ‘50% items’ accounts for ‘5% annual consumption value’ of items.

The above classification is indicative and not absolute.

#### **Advantages:**

- It helps in better time management and allocation of resources.
- It aids in fostering strategic pricing of the inventory.
- Increases accuracy in determining the adequate inventory needed by a company.
- It helps in demand forecasting by analyzing product’s popularity overtime.

#### **Disadvantages:**

- It is a time consuming technique which requires more resources than other techniques.
- It might ignore product trends in the market.
- It often conflicts with other inventory strategies.

#### **Illustration 1:**

Based on the information given below, classify the items into ABC categories

Category A – Rs. 50,000 and above (Total Value)

Category B Rs. 20,000 + Rs. 49,999 (Total Value)

Category C Rs. Below Rs. 20,000

Items	Units Sold	Cost per unit (Rs.)
1	20,000	1.50
2	9,000	1.50
3	15,000	2.50
4	40,000	3.50
5	10,000	.50
6	30,000	2.00
7	70,000	.50
8	1,00,000	.50
9	10,000	2.50
10	9,000	2.00

Find out the total value of the units and total the number of units sold and arrange them in A, B & C category of items.

**Solution:**

- 1) First find out the total value of items.

Items	Units Sold	Cost per unit (Rs.)	Total Value (Rs.)
1	20,000	1.50	30,000
2	9,000	1.50	13,500
3	15,000	2.50	37,500
4	40,000	3.50	1,40,000
5	10,000	.50	5,000
6	30,000	2.00	60,000
7	70,000	.50	35,000
8	1,00,000	.50	50,000
9	10,000	2.50	25,000
10	9,000	2.00	18,000

- 2) Now arrange them in descending order and total the units sold and value

Items	Units Sold	Cost per unit (Rs.)	Total Value (Rs.)
4	40,000	3.50	1,40,000
6	30,000	2.00	60,000
8	1,00,000	.50	50,000
3	15,000	2.50	37,500
7	70,000	.50	35,000
1	20,000	1.50	30,000
9	10,000	2.50	25,000
10	9,000	2.00	18,000
2	9,000	1.50	13,500
5	10,000	.50	5,000
	3,13,000		4,13,500

- 3) Calculate percentage of units and annual value.

Items	Units Sold	Cost per unit (Rs.)	Total Value (Rs.)	% Units sold	% of Annual Value
4	40,000	3.50	1,40,000	12.77	33.85
6	30,000	2.00	60,000	9.56	14.51
8	1,00,000	.50	50,000	31.94	12.09
3	15,000	2.50	37,500	4.79	8.94

7	70,000	.50	35,000	22.36	8.46
1	20,000	1.50	30,000	6.38	7.25
9	10,000	2.50	25,000	3.19	6.04
10	9,000	2.00	18,000	2.87	4.35
2	9,000	1.50	13,500	2.87	3.26
5	10,000	.50	5,000	3.19	1.20
	3,13,000		4,13,500		

Now arrange them in A, B, C categories

Category A items = 4, 6 and 8

$$\% \text{ of total units} = \frac{\text{Total Units } 1,70,000}{3,13,000} \times 100 = 54.31$$

Total Values 2,50,000

$$\% \text{ of total value} = \frac{2,50,000}{4,13,500} \times 100 = 60.45$$

Category B items = 3, 7, 1, 9

= Total units = 1,50,000 (50,000 + 70,000 + 20,000 + 10,000)

$$\% \text{ of total units} = \frac{1,50,000}{3,13,000} \times 100 = 36.72$$

= Total Value = 1,27,000 (37,000 + 35,000 + 30,000 + 25,000)

$$\% \text{ of total value} = \frac{1,27,000}{4,13,500} \times 100 = 30.69$$

Category C items = 10,2, 5

= Total Units = 28,000 (9,000 + 9,000 + 10,000)

$$= \% \text{ of total Units} = \frac{28,000}{313000} \times 100 = 8.9 \%$$

= Total Value = 36,500 = (18,000 + 13,500 + 5,000)

$$= \% \text{ of total value} = \frac{36500}{413500} \times 100 = 8.8 \%$$

## 20.8.2 The EOQ Model

The economic order quantity (EOQ) is a method that helps a company to estimate the optimum size of an inventory order that will decrease the total inventory costs. It helps in minimizing the holding and ordering costs of inventory overtime. It gives an indication whether or not the current order quantity is reasonable.

### Assumptions of the EOQ Model

- Ordering cost and the carrying cost of the inventory are the two costs associated with the inventory.
- Consumption rate of inventory is uniform throughout the year.
- The ordering and carrying costs are known with certainty and are constant over the year.
- The purchasing cost per unit does not change with the amount of inventory ordered i.e. there are no trade/quantity discounts.
- The time gap between order placement and its supply is nil i.e. *there is no lead time*.

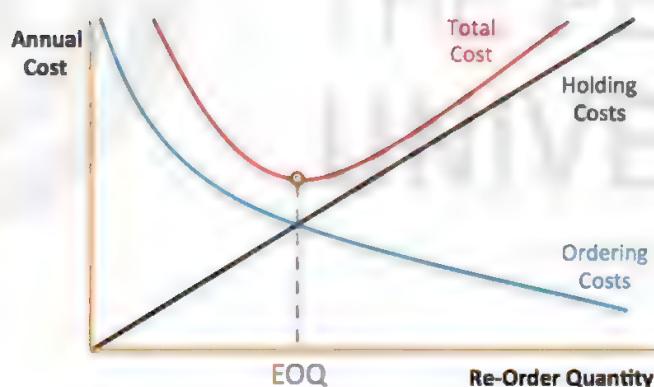
According to this model, the formula for economic order quantity is as follows:

$$EOQ = \sqrt{\frac{2AO}{C}}$$

According to this model:

- EOQ stands for Economic Quantity per order
- A stands for total annual requirement for the item
- O stands for ordering cost per order of that item
- C stands for holding cost per unit of that item

The EOQ model can be represented graphically as:



The total cost of ordering for an item decreases as the size per order increases. This happens because with the rise in size of the order, the total number of orders for an item falls thereby resulting in reduction in total order cost. On the other hand, the total annual carrying cost increases with the rise in order size. This happens because additional items would be stored by the firm. However, initially the total inventory cost decreases with the rise in size of order but then increases with the rise in size of the order. The level at which the total annual cost is the least, the trade-off between carrying and holding costs is attained. The economic order quantity is the order size attained at this particular level.

**EOQ Model Limitations:**

The limitations of the EOQ model exist because of its unrealistic assumptions listed as follows:

- Annual usage or requirement of inventory may not be known with certainty and may not be constant.
- Per unit carrying cost and per order ordering cost may not be constant.
- Usage of inventory may not be uniform throughout the year.
- The assumption of instant replenishment may not be true.
- There may exist a need to maintain additional inventory. There might be an unexpected demand for stocks. In order to meet contingencies, the firm may have to maintain additional safety stocks.

**Illustration 2:**

Calculate EOQ

- Ordering cost - ₹ 10 per order
- Annual quantity demand - 2000 units
- Holding cost - ₹ 1 per unit per annum

**Solution:**

The formula for calculating EOQ is

$$\text{EOQ} = \sqrt{\frac{2AO}{C}}$$

$$\text{EOQ} = \sqrt{\frac{2 \times 2000 \times 10}{1}}$$

$$\text{EOQ} = \sqrt{40000}$$

$$= 200 \text{ units}$$

**20.8.3 Reorder Point**

The inventory level at which the new order has to be placed to replenish the stock is known as reorder point level. It depends upon:

- Length of the time between the order placement and receiving the supply
- The rate of usage of an item

Reorder point/level = Lead time in days × Average daily usage of inventory

**Illustration 3:** A factory uses 160 units in a year. The purchase price per unit is Rs. 50. The other inventory costs are as given below:

Storage Cost = Rs 2 /unit/year

Insurance Cost = Rs 1 / unit/year

Interest = Rs 1 /unit/year

Expenses on issuing order = Rs 12/order

Expenses on payment of Bill = Rs 8/order

Calculate

a) EOQ

b) ordering cost, carrying cost and total cost

$$\text{Order cost per order (O)} = 12 + 8 = 20$$

$$\text{Carrying cost per unit per year (C)} = 2+1+1= 4$$

$$\begin{aligned}\text{EoQ} &= \sqrt{\frac{2AO}{C}} \\ &= \sqrt{\frac{2 \times 160 \times 20}{4}} \\ &= \sqrt{1600} \\ &= 40 \text{ units}\end{aligned}$$

$$\text{No. of order} = 4 \text{ order (160 / 40)}$$

$$\begin{aligned}\text{Total inventory Cost} &= 160 \times 50 \\ &= \text{Rs. 8,000}\end{aligned}$$

$$\text{Ordering Cost} = \frac{160}{40} \times 20 = ₹80$$

$$\text{Carrying cost} = \frac{40}{2} \times 4 = ₹80$$

$$\text{Total Cost} = 8,000 + 80 + 80 = ₹8160$$

### Types of Stock Level

In inventory management certain level of stock has to be maintained. The level of stock vary as per the requirement of the business. There are different types of stock levels 1) Minimum 2) Maximum and 3) Total

**Minimum Stock Level:-** It is that level of an item below which the actual stock should not normally be allowed to fall.

Minimum Stock Level: Reorder level - (average usage Rate  $\times$  Average lead time),

$$\text{Average Usage Rate} = \frac{\text{Maximum Usage Rate} + \text{Minimum Wage Rate}}{2}$$

$$\text{Average lead time} = \frac{\text{Maximum lead time} + \text{Minimum lead time}}{2}$$

**Maximum stock level:** It is that quantity of material above which the stock of an item not normally be allowed to exceed and which must be kept in stores at all the times.

$$\text{Maximum Stock Level} = \text{Minimum stock level} + \text{Reorder quantity}$$

**OR**

$$= (\text{Reorder level} + \text{Reorder quality}) - [\text{Minimum Usage Rate} \times \text{Minimum lead time}]$$

$$\text{Average stock level} = \frac{\text{Maximum level} + \text{Minimum level}}{2}$$

**OR**

$$= \text{Minimum level} + \frac{\text{Reorder Quantity}}{2}$$

$$\text{Total Stock cost} = \text{Material Cost} + \text{Total Ordering Cost} + \text{Total Carrying Cost}$$

$$\text{Material Cost} = \text{Requirement (Annual)} \times \text{Price/unit}$$

$$\text{Total Ordering Cost} = \frac{\text{Requirement}}{\text{EOQ}} \times \text{ordering cost}$$

$$\text{Total Carrying Cost} = \frac{\text{EOQ}}{2} \times \text{Holding Cost}$$

#### Illustration 4:

Following is the information of XYZ manufacturing company.

Find out the Reorder level, Minimum stock level and Maximum stock level

$$\text{Maximum consumption} = 900 \text{ units/day}$$

$$\text{Minimum consumption} = 600 \text{ units/day}$$

$$\text{Normal consumption} = 750 \text{ units/day}$$

$$\text{Reorder Quality} = 6000 \text{ units}$$

$$\text{Minimum period of Receiving Goods} = 10 \text{ days}$$

$$\text{Maximum period of Receiving Goods} = 15 \text{ days}$$

$$\text{Normal period of Receiving Goods} = 12 \text{ days}$$

#### Solution:

$$\text{Reorder point} = \text{Maximum Consumption} \times \text{Minimum period of receiving goods}$$

$$= 900 \times 15 = 13500 \text{ units}$$

$$\text{Minimum inventory (safety stock)} = \text{Reorder point} - (\text{normal consumption} \times \text{normal period of receiving goods})$$

$$= 13500 - (750 \times 12)$$

$$= 4500 \text{ units}$$

$$\text{Maximum stock level} = \text{Minimum stock level} + \text{reorder point}$$

$$4500 + 13500 = 18000 \text{ units}$$

#### 20.8.4 Just-In-Time Inventory Management

Just-in-time (JIT) is a management strategy that aligns raw-material orders from suppliers directly with production schedules in order to be able to meet consumer demands with minimum delays. It was first developed and applied in the Toyota manufacturing plants. In this method, labour, material and goods (to be used in manufacturing) are re-filled or scheduled to arrive exactly when needed in the manufacturing process. Thus, this inventory strategy allows companies to increase efficiency (by reducing inventory costs and increasing inventory turnover) and decrease wastage by receiving goods only when they need them for the production process.

##### Advantages:

- It results in the elimination of overproduction.
- It helps in keeping the stock holding costs to a minimum level.
- Less working capital is required.
- It results in less dead stock because there's less risk of unwanted stock left as the inventories are maintained on basis of customer demand.
- It emphasizes the 'right-first-time' concept, so that rework costs and the cost of inspection is minimized.

##### Disadvantages:

- This approach states zero tolerance for mistakes. As the inventory is kept at minimum levels, re-work in case of any production error is difficult.
- Successful application of JIT requires high reliance on suppliers, whose performances are out of control of the manufacturer.
- There are chances of occurrence of production line idling and downtime due to no buffers in JIT and that can have unfavorable effect on the production process and finances.
- In case of an unexpected increase in demand, companies following JIT would not be able to fulfil the new orders as there would be no excess inventory of finished goods.
- Transaction costs would be generally high depending upon the frequency of transactions.

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#### 20.9 INVENTORY TURNOVER RATIO

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Inventory Turnover Ratio demonstrates how effectively an organisation manages its inventory by comparing cost of goods sold with average inventory for a period. It is the number of times the average inventory is sold during a period.

$$\text{Inventory turnover ratio} = \frac{\text{Cost of goods sold}}{\text{Average inventory at cost}}$$

## Interpretation and Significance of Inventory Turnover Ratio

'Inventory Turnover Ratio' differs considerably among various sectors and industries. A high ratio indicates fast moving inventories and a low ratio shows slow moving/obsolete inventories in stock. Maintaining excessive inventories unnecessarily indicates poor management of inventory because it involves tying up money that could have been utilized in other business operations.

### Illustration 5:

In a company, the reported annual sales for the year ended in December, 2020 were ₹ 75,000. Gross profit was INR 35,000, opening inventory was ₹9,000 and closing inventory was INR 7,000. Calculate the inventory turnover ratio.

### Solution:

$$\begin{aligned}\text{Computation of Cost of Goods Sold} &= \text{Sales} - \text{Gross Profit} \\ &= 75,000 - 35,000 \\ &= \text{INR } 40,000\end{aligned}$$

$$\begin{aligned}\text{Average Inventory} &= (\text{Opening Inventory} + \text{Closing Inventory}) / 2 \\ &= (9,000 + 7,000) / 2 \\ &= \text{INR } 8,000\end{aligned}$$

$$\begin{aligned}\text{Inventory Turnover Ratio} &= \text{Cost of Goods Sold} / \text{Average Inventory} \\ &= 40,000 / 8,000 \\ &= 5 \text{ times}\end{aligned}$$

### Check your progress B

- 1) What are the different types of costs in inventory management.

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- 2) Explain the importance of various inventory management techniques.

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- 3) Describe the EOQ model of inventory management.

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- 4) Interpret Inventory Turnover Ratio and state its relevance.

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## 20.10 LET US SUM UP

There are 3 types of inventory in an organisation: raw materials, work-in-progress and finished goods. The primary objective of any firm is to manage the inventory so that operations of the business can be carried out without frequent interruptions. Inventory management determines constancy of supply chain as well as the financial health of a company. It includes a trade-off between costs and benefits of the inventory. Effective inventory management would aim at maximization of owners' wealth, which is in line with the overall goal of financial management. There are various factors influencing inventory management such as economic stability, availability of working capital in the firm, increasing interest rates, suppliers, lead time, product type present in the inventory etc.

Inventory management entails three types of cost i) **ordering cost** refers to the cost of placing one order of raw material, ii) **carrying cost** refers to the cost of managing and handling average inventory during the year and iii) **shortage costs** cost incurred by the company whenever it falls short of stock of inventory. ABC Analysis and EOQ model are the most important techniques for inventory management. ABC inventory management involves putting items into categories in the order of their relevance with A being the most valuable, B being moderate and C being the least valuable items in the inventory. ABC method helps to allocate managerial attention to inventory management in accordance with their value.

On the other hand, the EOQ is an inventory management method that provides a company with an optimal quantity that should be ordered. The EOQ model helps to ascertain the size of the order that will reduce the total cost of inventory to a minimum. Further, Inventory Turnover Ratio is used to measure how well an organization generates profits from the sale of its inventory. A high ratio signifies fast-moving inventories and a low ratio signifies that slow-moving or outdated inventories are in stock.

## 20.11 KEY WORDS

**ABC Inventory Management:** It is a technique of classifying inventory items into categories in the order of their relevance with A being the most valuable, B being moderate and C being the least valuable products in the inventory. It rations managerial efforts in managing inventory.

**Average Inventory:** It is calculated as the average of inventory at the start and at the end of the accounting period.

**Carrying Cost:** It refers to the cost of managing and handling average inventory during the year.

**Cost of Goods Sold:** COGS refers to the direct costs incurred in production of goods. The amount includes the cost of material and labour which are directly used to create the goods.

**Economic Order Quantity:** It is the number of units that should be added to a firm's inventory with each order to minimize the total costs of inventory i.e. holding costs, ordering costs, and shortage costs.

**Finished Goods:** Finished goods are goods that have been completed after the manufacturing process or purchased in a finished form which are not yet sold.

**Inventory Management:** Inventory management is the administration of non-capitalized assets and stock items. It directs the flow of goods/products from manufacturers to warehouses and from warehousing facilities to the final point of sale.

**Inventory Turnover Ratio:** Inventory turnover is a ratio that implies that during a given time period, how many times a firm has sold and replaced inventory.

**Lead Time:** Lead time describes the length of time a product takes from the time it is ordered to the time it finally arrives.

**Ordering Costs:** It refers to the cost of a single order of raw materials.

**Raw material:** The basic material which is used in the production process to manufacture a product is termed as raw material.

**Reorder Point:** 'The reorder point' is the level of inventory at which the new order is to be placed to replenish the stocks.

**Shortage Costs:** Costs incurred by the company whenever it falls short of inventory of basic raw materials.

## 20.12 SELF-ASSESSMENT QUESTIONS

- 1) The following data is available with respect to an item: Annual usage (A) = 20,000 units, ordering cost (O) = INR. 1,875 per order, carrying cost (C) = INR 3 per unit/per annum. Find out the EOQ of the item.
- 2) Explain EOQ model of determining the optimum order level.
- 3) What are the costs and benefits related with inventory? Explain.

- 4) Throw some light on ABC inventory management.
- 5) Differentiate between the various costs associated with maintaining inventory.
- 6) What is reorder point? How is it determined?

**NOTE: These questions will help you to understand the unit better. Try to answer them but do not submit the answers to the University. These questions are for practice only.**

**APPENDIX : TABLES**  
**TABLE A**  
**Future Value Interest Factor of Re. 1 (1 + i)<sup>n</sup>**

Period	1 %	2%	3%	4%	5%	6%	7%	8%	9%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.09000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171
19	12081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417
20	12202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044
21	12324	1.5157	1.8603	2.2788	2.7860	3.396	4.1406	5.0338	6.1088
22	12447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586
23	12572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579
24	12697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111
25	12824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231
30	1.3478	1.8114	2.4273	3.2434	4.3219	5.7435	7.6123	10.0631	3.268
40	1.4889	2.2080	3.2620	4.8010	7.0400	1.0286	14.9742	1.7253	1.409
50	1.6446	2.6916	4.3839	7.1067	11.4671	8.4202	9.4574	6.9027	4.358
60	1.8167	3.2810	5.8916	10.520	18.679	32.988	57.946	1.01261	76.03

Table : contd .....

*Interest Rate*

Period	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	1.1000	1.1200	1.1400	1.1500	1.1600	1.1800	1.2000	1.2400	1.2800	1.3200	1.3600
2	1.2100	1.2544	1.2996	1.3225	1.3456	1.3924	1.4400	1.5376	1.6384	1.7424	1.8496
3	1.3310	1.4049	1.4815	1.5209	1.5609	1.6430	1.7280	1.9066	2.0972	2.3000	2.5155
4	1.4641	1.5735	1.6890	1.7490	1.8106	1.9388	2.0736	2.3642	2.6844	3.0360	3.4210
5	1.6105	1.7623	1.9254	2.0114	2.1003	2.2878	2.4883	2.9316	3.4360	4.0075	4.6526
6	1.7716	1.9738	2.1950	2.3131	2.4364	2.6996	2.9860	3.6352	4.3980	5.2899	6.3275
7	1.9487	2.2107	2.5023	2.6600	2.8262	3.1855	3.5832	4.5077	5.6295	6.9826	8.6054
8	2.1436	2.4760	2.8526	3.0590	3.2784	3.7589	4.2998	5.5895	7.2058	9.2170	11.703
9	2.3579	2.7731	3.2519	3.5179	3.8030	4.4355	5.1598	6.9310	9.2234	12.166	15.917
10	2.5937	3.1058	3.7072	4.0456	4.4114	5.2338	6.1917	8.5944	11.806	16.060	21.647
11	2.8531	3.4785	4.2262	4.6524	5.1173	6.1759	7.4301	10.657	15.112	21.199	29.439
12	3.1384	3.8960	4.8179	5.3503	5.9360	7.2876	8.916	13.215	19.343	27.983	40.037
13	3.4523	4.3635	5.4924	6.1528	6.8858	8.5994	10.699	16.386	24.759	36.937	54.451
14	3.7975	4.8871	6.2613	7.0757	7.9875	10.147	12.839	20.319	31.691	48.757	74.053
15	4.1772	5.4736	7.1379	8.1371	9.2655	11.974	15.407	25.196	40.565	64.359	100.71
16	4.5950	6.1304	8.1372	9.3576	10.748	14.129	18.488	31.243	51.923	84.954	136.97
17	5.0545	6.8660	9.2765	10.761	12.468	16.672	22.186	38.741	66.461	112.14	18.628
18	5.5599	7.6900	10.575	12.375	14.463	19.673	26.623	48.039	85.071	148.02	253.34
19	6.1159	8.6128	12.056	14.232	16.777	23.214	31.948	59.568	108.89	195.39	344.54
20	6.7275	9.6463	13.743	16.367	19.461	27.393	38.338	73.864	139.38	257.92	468.57
21	7.4002	10.804	15.668	18.822	22.574	32.324	46.005	91.592	178.41	340.45	637.26
22	8.1403	12.100	17.861	21.645	26.186	38.142	55.206	113.57	228.36	449.39	866.67
23	8.9543	13.552	20.362	24.891	30.376	45.008	66.247	140.83	292.30	593.20	1178.7
24	9.8497	15.179	23.212	28.625	35.236	53.109	79.497	174.63	374.14	783.02	1603.0
25	10.835	17.000	26.462	32.919	40.874	62.669	95.396	216.54	478.90	1033.6	2180.1
30	17.449	29.960	50.950	66.212	85.850	143.37	237.38	634.82	1645.5	4142.1	10143
40	45.259	93.051	188.88	267.86	378.72	750.38	1469.8	5455.9	19427.	66521.	*
50	117.39	289.00	700.23	1083.7	1670.7	3927.4	9100.4	46890.	*	*	*
60	304.48	897.60	2595.9	4384.0	7370.2	20555.	56348.	*	*	*	*

\*The factor is greater than 99.999.

**TABLE B**  
**Present Value Interest Factor of Re 1  $1 / (1 + i)^n$**   
**Interest Rate**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994	0.0754
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460	0.0318
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213	0.0134

Contd...

Table : contd. ....

Period	<i>Interest Rate</i>											
	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%	
1	0.9091	0.8929	0.8772	0.8696	0.8621	0.8475	0.8333	0.8065	0.7813	0.7576	0.7353	
2	0.8264	0.7972	0.7695	0.7561	0.7432	0.7182	0.6944	0.6504	0.6104	0.5739	0.5407	
3	0.7513	0.7118	0.6750	0.6575	0.6407	0.6086	0.5787	0.5245	0.4768	0.4348	0.3975	
4	0.6830	0.6355	0.5921	0.5718	0.5523	0.5158	0.4823	0.4230	0.3725	0.3294	0.2923	
5	0.6209	0.5674	0.5194	0.4972	0.4761	0.4371	0.4019	0.3411	0.2910	0.2495	0.2149	
6	0.5645	0.5066	0.4556	0.4323	0.4104	0.3704	0.3349	0.2751	0.2274	0.1890	0.1580	
7	0.5132	0.4523	0.3996	0.3759	0.3538	0.3139	0.2791	0.2218	0.1776	0.1432	0.1162	
8	0.4665	0.4039	0.3506	0.3269	0.3050	0.2660	0.2326	0.1789	0.1388	0.1085	0.0854	
9	0.4241	0.3606	0.3075	0.2843	0.2630	0.2255	0.1938	0.1443	0.1084	0.0822	0.0628	
10	0.3855	0.3220	0.2697	0.2472	0.2267	0.1911	0.1615	0.1164	0.0847	0.0623	0.0462	
11	0.3505	0.2875	0.2366	0.2149	0.1954	0.1619	0.1346	0.0938	0.0662	0.0472	0.0340	
12	0.3186	0.2567	0.2076	0.1869	0.1685	0.1372	0.1122	0.0757	0.0517	0.0357	0.0250	
13	0.2897	0.2292	0.1821	0.1625	0.1452	0.1163	0.0935	0.0610	0.0404	0.0271	0.0184	
14	0.2633	0.2046	0.1597	0.1413	0.1252	0.0985	0.0779	0.0492	0.0316	0.0205	0.0135	
15	0.2394	0.1827	0.1401	0.1229	0.1079	0.0835	0.0649	0.0397	0.0247	0.0155	0.0099	
16	0.2176	0.1631	0.1229	0.1069	0.0930	0.0708	0.0541	0.0320	0.0193	0.0118	0.0073	
17	0.1978	0.1456	0.1078	0.0929	0.0802	0.0600	0.0451	0.0258	0.0150	0.0089	0.0054	
18	0.1799	0.1300	0.0946	0.0808	0.0691	0.0508	0.0376	0.0208	0.0118	0.0068	0.0039	
19	0.1635	0.1161	0.0829	0.0703	0.0596	0.0431	0.0313	0.0168	0.0092	0.0051	0.0029	
20	0.1486	0.1037	0.0728	0.0611	0.0514	0.0365	0.0261	0.0135	0.0072	0.0039	0.0021	
21	0.1351	0.0926	0.0638	0.0531	0.0443	0.0309	0.0217	0.0109	0.0056	0.0029	0.0016	
22	0.1228	0.0826	0.0560	0.0462	0.0382	0.0262	0.0181	0.0088	0.0044	0.0022	0.0012	
23	0.1117	0.0738	0.0491	0.0402	0.0329	0.0222	0.0151	0.0071	0.0034	0.0017	0.0008	
24	0.1015	0.0659	0.0431	0.0349	0.0284	0.0188	0.0126	0.0057	0.0027	0.0013	0.0006	
25	0.0923	0.0588	0.0378	0.0304	0.0245	0.0160	0.0105	0.0046	0.0021	0.0010	0.0005	
30	0.0573	0.0334	0.0196	0.0151	0.0116	0.0070	0.0042	0.0016	0.0006	0.0002	0.0001	
40	0.0221	0.0107	0.0053	0.0037	0.0026	0.0013	0.0007	0.0002	0.0001	*	*	
50	0.0085	0.0035	0.0014	0.0009	0.0006	0.0003	0.0001	*	*	*	*	

"The factor is zero to four decimal places.

**TABLE C**  
**Present Value Interest Factor of an Annuity of Re. 1  $(1+i)^n - 1 / i / (1+i)^n$**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177
11	10.3676	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052
12	11.2551	10.5753	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607
13	12.1337	11.3484	10.6350	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869
14	13.0037	12.1062	11.2961	10.5631	9.8986	9.2950	8.7455	8.2442	7.7862
15	13.8651	12.8493	11.9379	11.1184	10.3797	9.7122	9.1079	8.5595	8.0607
16	14.7179	13.5777	12.5611	11.6523	10.8378	10.1059	9.4466	8.8514	8.3126
17	15.5623	14.2919	13.1661	12.1657	11.2741	10.4773	9.7632	9.1216	8.5436
18	16.3983	14.9920	13.7535	12.6593	11.6896	10.8276	10.0591	9.3719	8.7556
19	17.2260	15.6785	14.3238	13.1339	12.0853	11.1581	10.3356	9.6036	8.9501
20	18.0456	16.3514	14.8775	13.5903	12.4622	11.4699	10.5940	9.8181	9.1285
21	18.8570	17.0112	15.4150	14.0292	12.8212	11.7641	10.8355	10.0168	9.2922
22	19.6604	17.6580	15.9369	14.4511	13.1630	12.0416	11.0612	10.2007	9.4424
23	20.4558	18.2922	16.4436	14.8568	13.4886	12.3034	11.2722	10.3741	9.5802
24	21.2434	18.9139	16.9355	15.2470	13.7986	12.5504	11.4693	10.5288	9.7066
25	22.0232	19.5235	17.4131	15.6221	14.0939	12.7834	11.6536	10.6748	9.8226
30	25.8077	22.3965	19.6004	17.2920	15.3725	13.7648	12.4090	11.2578	10.2737
40	32.8347	27.3555	23.1148	19.7928	17.1591	15.0463	13.3317	11.9246	10.7574
50	39.1.961	31.4236	25.7298	21.4822	18.2559	15.7619	13.8007	12.2335	10.9617

Table C contd. ....

Period	Interest Rate										
	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%	
1	0.9191	0.8929	0.8772	0.8696	0.8621	0.8475	0.8333	0.8065	0.7813	0.7576	
2	1.7355	1.6901	1.6467	1.6257	1.6052	1.5656	1.5278	1.4568	1.3916	1.3315	
3	2.4869	2.4018	2.3216	2.2832	2.2459	2.1743	2.1065	1.9813	1.8684	1.7663	
4	3.1699	3.0373	2.9137	2.8550	2.7982	2.6901	2.5887	2.4043	2.2410	2.0957	
5	3.7908	3.6048	3.4331	3.3522	3.2743	3.1272	2.9906	2.7454	2.5320	2.3452	
6	4.3553	4.1114	3.8887	3.7845	3.6847	3.4976	3.3255	3.0205	2.7594	2.5342	
7	4.8684	4.5638	4.2883	4.1604	4.0386	3.8115	3.6046	3.2423	2.9370	2.6775	
8	5.3349	4.9676	4.6389	4.4873	4.3436	4.0776	3.8372	3.4212	3.0758	2.7860	
9	5.7590	5.3282	4.9464	4.7716	4.6065	4.3030	4.0310	3.5655	3.1842	2.8681	
10	6.1446	5.6502	5.2161	5.0188	4.8332	4.4941	4.1925	3.6819	3.2689	2.9304	
11	6.4951	5.9377	5.4527	5.2337	5.0286	4.6560	4.3271	3.7757	3.3351	2.9776	
12	6.8137	6.1944	5.6603	5.4206	5.1971	4.7932	4.4392	3.8514	3.3868	3.013	
13	7.1034	6.4235	5.8424	5.5831	5.3423	4.9095	4.5327	3.9124	3.4272	3.0404	
14	7.3667	6.6282	6.0021	5.7245	5.4675	5.0081	4.6106	3.9616	3.4587	3.0609	
15	7.6061	6.8109	6.1422	5.8474	5.5755	5.0916	4.6755	4.0013	3.4834	3.0764	
16	7.8237	6.9740	6.2651	5.9542	5.6685	5.1624	4.7296	4.0333	3.5026	3.0882	
17	8.0216	7.1196	6.3729	6.0472	5.7487	5.2223	4.7746	4.0591	3.5177	3.0971	
18	8.2014	7.2497	6.4674	6.1280	5.8178	5.2732	4.8122	4.0799	3.5294	3.1039	
19	8.3649	7.3658	6.5504	6.1982	5.8775	5.3162	4.8435	4.0967	3.5386	3.1090	
20	8.5136	7.4694	6.6231	6.2593	5.9288	5.3527	4.8696	4.1103	3.5458	3.1129	
21	8.6487	7.5620	6.6870	6.3125	5.9731	5.3837	4.8913	4.1212	3.5514	3.1158	
22	8.7715	7.6446	6.7429	6.3587	6.0113	5.4099	4.9094	4.1300	3.5558	3.1180	
23	8.8832	7.7184	6.7921	6.3988	6.0442	5.4321	4.9245	4.1371	3.5592	3.1197	
24	8.9847	7.7843	6.8351	6.4338	6.0726	5.4509	4.9371	4.1428	3.5619	3.1210	
25	9.0770	7.8431	6.8729	6.4641	6.0971	5.4669	4.9476	4.9474	3.5640	3.1220	
30	9.4269	8.0552	7.0027	6.5660	6.1772	5.5168	4.9789	4.1601	3.5693	3.1242	
40	9.7791	8.2438	7.1050	6.6418	6.2335	5.5482	4.9966	4.1659	3.5712	3.1250	
50	9.9148	8.3045	7.1327	6.6605	6.2463	5.5541	4.9995	4.1666	3.5714	3.1250	

**TABLE D**  
**Future Value Interest Factor an Annuity of Re. 1 ( $1 + i$ )  $n-1 / i$**

**Interest Rate**

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004
8	8.2857	8.5830	8.8932	9.2142	9.5491	9.8975	10.260	10.637	11.028
9	9.3685	9.7546	10.159	10.583	11.027	11.491	11.978	12.488	13.021
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160
21	23.239	25.783	28.676	31.969	35.719	39.993	44.865	50.423	56.765
22	24.472	27.299	30.537	34.248	38.505	43.392	49.006	55.457	62.873
23	25.716	28.845	32.453	36.618	41.430	46.996	53.436	60.893	69.532
24	26.973	30.422	34.426	39.083	44.502	50.816	58.177	66.765	76.790
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.28	136.31
40	48.886	60.402	75.401	95.026	120.80	154.76	199.64	259.06	337.88
50	64.463	84.579	112.80	152.67	209.35	290.34	406.53	573.77	815.08
60	81.670	114.05	163.05	237.99	353.58	533.13	813.52	1253.2	1944.8

*Interest Rate*

Period	10%	12%	14%	15%	16%	18%	20%	24%	28%	32%	36%
1	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
2	2.1000	2.1200	2.1400	2.1500	2.1600	2.1800	2.2000	2.2400	2.2800	2.3200	2.3600
3	3.3100	3.3744	3.4396	3.4725	3.5056	3.5724	3.6400	3.7776	3.9184	4.0624	4.2096
4	4.6410	4.7793	4.9211	4.9934	5.0665	5.2154	5.3680	5.6842	6.0156	6.3624	6.7251
5	6.1051	6.3528	6.6101	6.7424	6.8771	7.1542	7.4416	8.0484	8.6999	9.3983	10.146
6	7.7156	8.1152	8.5355	8.7537	8.9775	9.4420	9.9299	10.980	12.136	13.406	14.799
7	9.4872	10.089	10.730	11.067	11.414	12.142	12.916	14.615	16.534	18.696	21.126
8	11.436	12.300	13.233	13.727	14.240	15.327	16.499	19.123	22.163	25.678	29.732
9	13.579	14.776	16.085	16.786	17.519	19.086	20.799	24.712	29.369	34.895	41.435
10	15.937	17.549	19.337	20.304	21.321	23.521	25.959	31.643	38.593	47.062	57.352
11	18.531	20.655	23.045	24.349	25.733	28.755	32.150	40.238	50.398	63.122	78.998
12	21.384	24.133	27.271	29.002	30.850	34.931	39.581	50.895	65.510	84.320	108.44
13	24.523	28.029	32.089	34.352	36.786	42.219	48.497	64.110	84.853	112.30	148.47
14	27.975	32.393	37.581	40.505	43.672	50.818	59.196	80.496	109.61	149.24	202.93
15	31.772	37.280	43.842	47.580	51.660	60.965	72.035	100.82	141.30	198.00	276.98
16	35.950	42.753	50.980	55.717	60.925	72.939	87.442	126.01	181.87	262.36	377.69
17	40.545	48.884	59.118	65.075	71.673	87.068	105.93	157.25	233.79	347.31	514.66
18	45.599	55.750	68.394	75.836	84.141	103.74	128.12	195.99	300.25	459.45	700.94
19	51.159	63.440	78.969	88.212	98.603	123.41	154.74	244.03	385.32	607.47	954.28
20	57.275	72.052	91.025	102.44	115.38	146.63	186.69	303.60	494.21	802.86	1298.8
21	64.002	81.699	104.77	118.81	134.84	174.02	225.03	377.46	633.59	1060.8	1767.4
22	71.403	92.503	120.44	137.63	157.41	206.34	271.03	469.06	812.00	1401.2	2404.7
23	79.543	104.60	138.30	159.28	183.60	244.49	326.24	582.63	1040.4	1850.6	3271.3
24	88.497	118.16	158.66	184.17	213.98	289.49	392.48	723.46	1332.7	2443.8	4450.0
25	98.347	133.33	181.87	212.79	249.21	342.60	471.98	898.09	1706.8	3226.8	6053.0
30	164.49	241.33	356.79	434.75	530.31	790.95	1181.9	2640.9	58732	12941.	28172.3
40	442.59	767.09	1342.0	1779.1	2360.8	41632	7343.9	22729.	69377.	*	*
50	1163.9	2400.0	4994.5	7217.7	10436.	21813.	45497.	*	*	*	*
60	3034.8	7471.6	18535.	29220.	46058.	*	*	*	*	*	*

\*The factor is greater than 99,999.



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Re-Scheduled Examination of Dec, 2018

Examinations Cancelled and re-scheduled:  
Course code Original Schedule of Exam Re-schedule of Exam

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Dr. P. Vignakumar from School of Agriculture was the Trainer and Assessor for the training programme. Various aspects of Food Safety with special focus on Hygiene and Sanitary procedures to be followed by Food Business Operators were covered in the training programme. IGNOU is one of the Food Safety Standards Authority of India (FSSAI) approved Training Partner.

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